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SOME ORIGINAL AMERICAN CONTRIBUTIONS TO DERMATOLOGY

PRESIDENT'S ADDRESS

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Deeply conscious of the honor of presiding at the sixty-first annual meeting of the American Dermatological Association, I take this opportunity to express my appreciation of this honor. Any dermatologist has reason to be proud of membership in our association. Founded in 1876, it is one of the oldest dermatologic organizations in the world. Many of its founders were charter members of the New York Dermatological Society, which was the first dermatologic society ever to be organized. This society has enjoyed an unbroken existence since 1869.

It has been the custom since the first meeting of this association for the presiding officer to deliver an address. The question has been raised, and, I believe, with reason, whether this custom should be continued. As no action has yet been taken to the contrary, I hope you will bear with me.

The first president, J. C. White, set an admirable example by delivering an address consisting of a few paragraphs setting forth the reasons for the organization of this body, followed by a few words of welcome. Unfortunately, neither he nor his successors followed this model of brevity. White's second address seems to have become the model, as Duhring's first address [1] was lengthy and his second address [2] was almost a volume. Those of you who have not read Duhring's first address would do well to read it. The title is "The Rise of American Dermatology." It is full of interesting facts which caused me to spend many more hours in the library than I had time for. It radiates enthusiasm and satisfaction over the progress of dermatology from humble beginnings.

My objective has been to search for and to record some of the early original American contributions to dermatology. Be it noted that I say

Read at the sixty-first annual meeting of the American Dermatological Association, Inc., June 9, 1938, Del Monte, Calif.

1. Duhring, L. A.: New York M. J. **30**:449, 1879.
2. Duhring, L. A.: Arch. Dermat. **6**:400, 1880.

some and not all. I am relying on the immunity to criticism enjoyed by the president to save myself from annihilation. I add, however, that I hope you will make suggestions and additions as you may see fit.

The first medical document published in America happens to have been on a dermatologic subject. The Reverend Thomas Thacher published in 1677 a brochure entitled "A Brief Guide to Smallpox and Measles." The original is in the library of the Massachusetts Historical Society. There is also an autotype copy in the Surgeon General's Library, which I hope to see in the near future. In the seventeenth century there seems to have been no clamoring on the part of the younger dermatologists for a journal in which to publish their work, as no other paper appeared until that of John Mitchell, of Virginia, in 1744. It is entitled "An Essay upon the Causes of the Different Colors of Different People in Different Climes" and is a profound inquiry into the problem of cutaneous pigmentation. Again some time elapsed. Not till 1774 did Benjamin Rush make "An Inquiry into the Natural History of Medicine Among the Indians of North America."[3] He reported the results of these researches in an oration before the American Philosophical Society in Philadelphia. As a graduate of Rush Medical College I am not particularly pleased to find him declaring that "leprosy, elephantiasis, scurvy and venereal disease appear to be different modifications of the same primary disorder. The same causes produce them in every age and country."

The first American research in the anatomy of the skin of which there is a record is that carried out by William Baynham, a resident of Virginia, who while spending sixteen years in England became assistant to Mr. Else, the professor of anatomy at Cambridge. Baynham was so expert at preparing dissections for demonstration that Mr. Else took him in as his associate and assured him that he was to be his successor. Unfortunately, Mr. Else died of a stroke and left nothing in writing as evidence of his promise. Nevertheless, Baynham came within one vote of being named. About 1790 Baynham injected the leg of a woman, excised a piece of skin, macerated and removed the epidermis and demonstrated the vessels in the cutis. This work was cited by William Cruickshank; it was also mentioned by Caspar Wistar in the first edition of his "System of Anatomy," published in 1823.

In 1800, James Tongue, of Maryland, published "Lues Venera," in which he undertook to prove that syphilis was not introduced into Europe from America and that syphilis and gonorrhea were two distinct

3. Rush, B.: Medical Inquiries and Observations, ed. 2, London, Thomas Dobson, 1794, vol. 1, p. 24.

forms of disease. There is no longer any doubt about the correctness of the second contention, and who can say that he was wrong in the first?

George S. Shattuck, in the "Boylston Prize Essays" for 1806 and 1807, published in 1810, stated:

> The Cuticula, called also epidermis and scarf skin is the external lamina which comes in contact with the atmosphere. It is a fine membrane entirely devoid of sensibility: and its vascularity seems to be somewhat questionable as all anatomists agree in their inability to inject any vessels belonging to it.

And, I may add, no one has succeeded even to this day.

The first series of dermatologic lectures to be given in the United States was that delivered by H. D. Bulkley in 1837 at the Broome Street Infirmary for Diseases of the Skin. This infirmary was the first of its kind in America and continued to fulfil a useful function for many years.

An outstanding event in the history of American dermatology occurred in 1845, when Noah Worcester, of Cleveland, published his "Diseases of the Skin." It is a remarkable book and can rightfully take its place with any of its contemporaries. It is interesting to note that the dermatoses are discussed under the headings of the essential lesions, an arrangement still used by Darier in his "Précis." I was much impressed by Worcester's accurate description of the symptomatology and etiology of scabies and equally surprised to see his statement that impetigo is not contagious. It was a great loss to American medicine when Worcester died at the early age of 35.

After the appearance of Worcester's book dermatology seems to have "hibernated" until well after the close of the Civil War. Perhaps William Peterson could explain this on the basis of the weather; or the astronomers, by the sun spots; or the astrologers, by the relative position of the planets. The fact is that about 1870 there occurred a sudden impetus to dermatologic activity, which has increased in geometric progression until there are no longer enough meeting places to accommodate the meetings, enough time to attend them or enough journals to print the proceedings. I venture to predict that eventually there will not be enough dermatologists to attend all the meetings or to read all the proceedings of all the meetings.

This impetus was due, first, to the return of physicians from abroad who had had training in dermatology; second, to the organization of the New York Dermatological Society, and third, to the organization of the American Dermatological Association in 1876.

The first dermatologic address delivered in the United States was that given by H. D. Bulkley on May 18, 1869, at the first meeting of the New York Dermatological Society. This society, as I have said, is the

oldest organization of its kind in the world. Bulkley's address did not appear in print, however, until nine years later.[4]

I have always associated electrolysis with the name of Hardaway. It was therefore interesting, to me at least, to look into the origin of the technic now in universal use. In 1869, Charles E. Michel, an ophthalmologist of St. Louis, having struggled with troublesome cilia in cases of trachoma, conceived the idea of heating a platinum needle to white heat by means of a Groves battery and then plunging it into the follicle. This technic proved painful and unsatisfactory, and after much experimentation Michel perfected the technic which is now in general use and which he set forth in detail in 1875.[5] Another ingenious method of epilation, evolved by Bulkley but completely forgotten, consisted of using a flat, two-edged surgical needle sharpened to the keenness of a razor. The needle was plunged into the follicle and turned about in order to destroy it. At times the needle was first dipped in phenol, but the reaction to this was too violent. Bulkley had written a paper on the subject but did not reach home from abroad in time to read it at the 1878 meeting of the American Dermatological Association.[6] In a discussion on the paper by Hardaway [7] at the same meeting Duhring went Bulkley one edge better by describing a triangular cutting needle. I am not surprised that the instrument failed to "catch on."

The inventive and original-minded Piffard produced an instrument which seems to have attracted little or no attention. In a paper entitled "The Compound Microscope as an aid to the Study of the Skin and Skin Lesions *in Situ*" [8] he described an apparatus consisting of a compound microscope mounted on a standard 5 feet (1.5 meter) in height. Bright sunlight was necessary for the best results. How much was accomplished by the use of this invention is not to be found in the records.

A contribution of Duhring which does not appear in the Sydenham volume and which I think of much interest is his paper entitled "Pruritus Hiemalis: an undescribed form of Pruritus." [9] Among 412 patients in the wards of the Philadelphia General Hospital he observed 22 cases of this disease. In all his travels in Europe he had never observed a similar case. A detailed account of the symptoms and the findings is given, but apparently the cause was missed entirely, for he advised alkaline hot baths before retiring.

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4. Bulkley, H. D.: Arch. Dermat. **4**:25, 1878.
5. Michel, C. E.: St. Louis Clin. Rec. **2**:145, 1875.
6. Bulkley, H. D.: Arch. Dermat. **4**:287, 1878.
7. Hardaway, W. A.: Arch. Dermat. **4**:337, 1878.
8. Piffard, H. G.: Arch. Dermat. **1**:120, 1875.
9. Duhring, L. A.: Philadelphia M. Times **4**:225, 1874.

A most important and original contribution of this period was that of S. Weir Mitchell [10] on erythromelalgia. Although Mitchell was not a dermatologist, we gladly accept his contribution, which has received worldwide recognition.

Having struggled since my dermatologic infancy with the differential diagnosis of fungous infections and dyshidrosis, I have found the monograph of "Pompholyx" by A. R. Robinson of much interest. Fortunately for the sake of reference, this monograph was reprinted in the ARCHIVES OF DERMATOLOGY in 1877.[11] Robinson demonstrated conclusively that the vesicle is not formed by the retention of sweat. Naturally, Tilbury Fox was not to be downed without a struggle. What with pompholyx and ringworm elbowing each other about over the palms and soles, there seems to be little chance for dyshidrosis to survive.

Whereas the seventh decade of the nineteenth century produced many contributions of importance, the eighth decade was not to be outdone. One of the conditions described in early contributions, even though its very title has been questioned, was "synovial lesion of the skin." The first description of this disorder appeared in the first edition of Hyde's "Diseases of the Skin," published in 1883.

The outstanding contributions during the period from 1883 to 1891 were those of Duhring on dermatitis herpetiformis. Nothing could be said here that would add to Duhring's fame. The dermatologic world is immeasurably indebted to him for his observations and to the New Sydenham Society of London, England, for the reprinting of his papers in one volume.[12]

At the tenth meeting of the American Dermatological Association, a paper which seems to have attracted very little attention but which to me, at least, is of great importance, was read by Prince A. Morrow.[13] The title was "Keratosis Follicularis." Morrow reviewed the meager literature very carefully and gave excellent clinical and histologic descriptions of the disorder. Moreover, he did not make the mistake of assuming that the dyskeratotic cells were psorosperms. Although this paper appeared three years before that of Darier,[14] Darier made no mention of it nor of that of White,[15] probably because he was not aware of the existence of either paper. I hereby make a plea for keratosis

10. Mitchell, S. W.: Philadelphia M. Times **3**:81, 1872.

11. Robinson, A. R.: Arch. Dermat. **3**:289, 1877.

12. Duhring, L. A.: A Collection of Dr. Duhring's Papers on Dermatitis Herpetiformis, in Selected Monographs, London, New Sydenham Society, 1893, no. 143, pp. 177-297.

13. Morrow, P. A.: J. Cutan. & Ven. Dis. **4**:257, 1886.

14. Darier, J.: Ann. de dermat. et syph. **10**:597, 1889.

15. White, J. C.: J. Cutan. & Genito-Urin. Dis. **7**:201, 1889.

follicularis to be called, if a physician's name must be used, Morrow's disease instead of Darier's disease.

Dermatologists are also indebted to Prince Morrow for his papers on "drug eruptions," which are reprinted in the same Sydenham volume with those of Duhring. As antipyrine was the first drug reported by the French writers as the cause of fixed exanthem, I read his report on this drug very carefully, hoping that I might find that such an eruption had come under his observation. "It begins to subside promptly on the disuse of the drug, and generally, but not always, occurs when the drug is again administered" is as close as he came to it.

Another important contribution of this period was the series of papers that culminated in a volume entitled "Dermatitis Venenata" by J. C. White.[16] White's profound knowledge of both botany and dermatology makes this a work which could be read by all dermatologists with profit even to this day.

In a letter to the *Boston Medical and Surgical Journal,* dated June 10, 1901, White[17] described a new form of dermatitis, produced by caterpillars. The dermatitis occurred in the form of linear lesions in the tracks of caterpillars on persons who while sitting under shade trees discovered the larvae of the brown-tailed moth (Euproctis chrysorrhoea) crawling on their skin. The dermatitis yielded promptly to simple external applications.

At the Dermatological Congress of Paris in 1887 Unna described a condition with which no one present was familiar. In the "International Atlas for Rare Skin Diseases" of the following year Pollitzer[18] gave a complete clinical and histologic account of acanthosis nigricans. In the same issue and following the report of Pollitzer there was a case history by Janovsky, but this did not include a histologic report. It is therefore justifiable to credit Pollitzer with the first full description of this pathologic entity.

At the eleventh International Congress, in Rome, Italy, in 1894, Corlett[19] read a paper entitled "Cold as an Etiological Factor in Diseases of the Skin with a Report of Cases." This paper gave excellent verbal and photographic descriptions of the orbicular type of dermatitis seen on the dorsal surfaces of the hands in winter in the north temperate zone. Its place in the list of original contributions should be unquestioned.

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16. White, J. C.: Dermatitis Venenata: An Account of the Action of External Irritants upon the Skin, Boston, Cupples & Hurd, 1887.

17. White, J. C.: Boston M. & S. J. **144**:599, 1901.

18. Pollitzer, S.: Acanthosis Nigricans, in Unna, P. G.; Morris, M.; Duhring, L. A., and Leloir, H.: International Atlas for Rare Skin Diseases, Hamburg, L. Voss, 1890, no. 4, p. 11.

19. Corlett, W. T.: J. Cutan. & Genito-Urin. Dis. **12**:457, 1894.

A most interesting event occurred in 1894. At the meeting of the American Dermatological Association, Gilchrist, "by invitation," presented a case which Duhring had asked him to investigate. The condition was described as "protozoan dermatitis," and in the proceedings of that meeting [20] is found the following report:

> The protozoa were shown under the microscope. They were very numerous, sixty sometimes being in the field. Twenty had been found in one giant cell. A dog had been inoculated, the same disease reproduced and protozoa being found. Dr. Gilchrist considered the bodies as belonging to the vegetable rather than to the animal kingdom.

Two years later Gilchrist [21] published a full report of the case under the title "A Case of Blastomycetic Dermatitis in Man." Gilchrist was much concerned about priority and pointed out that his case was demonstrated May 15, 1894, but that Busse's [22] case was not demonstrated until June. The concern of Gilchrist over priority is interesting in view of the probability that Busse's case was one of dermatitis caused by Cryptococcus histolytica.

The first clinical description which I have found of hypertrophic lichen planus is that by Corlett.[23] Although he did not name it as such, the clinical description and the photographs are so characteristic that there can be no doubt as to the disease he had under observation. The observations of Corlett were confirmed by Fordyce [24] in his report of a case with complete histologic observations. "Dr. Corlett's case presents many features in common with my own, and I am inclined, after a careful reading of his clinical report, to consider it one of lichen planus."

In the preceding year, Fordyce [25] described a condition of the vermilion border of the lips to which the name "Fordyce's disease" has subsequently been given, although it is universally recognized that the condition is not actually a disease. Even though the paper does not fall into the period I am discussing I cannot refrain from calling attention to the work of the secretary of this association, Fred Weidman,[26] who demonstrated that each so-called lesion in the cases he studied so intensively was actually a sebaceous gland.

Although the year 1896 has already proved to be a difficult one as regards questions of priority, mention must still be made of infection

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20. Gilchrist, T. C.: J. Cutan. & Genito-Urin. Dis. **12**:496, 1894.
21. Gilchrist, T. C.: Johns Hopkins Hosp. Rep. **1**:269, 1896.
22. Busse, O.: Centralbl. f. Bakt. (Abt. 1) **16**:175, 1894.
23. Corlett, W. T.: J. Cutan. & Genito-Urin. Dis. **14**:301, 1896.
24. Fordyce, J. A.: J. Cutan. & Genito-Urin. Dis. **15**:49, 1897.
25. Fordyce, J. A.: J. Cutan. & Genito-Urin. Dis. **14**:413, 1896.
26. Margolies, A., and Weidman, F.: Statistical and Histologic Studies of Fordyce's Disease, Arch. Dermat. & Syph. **3**:723 (June) 1921.

with Coccidioides. Rixford and Gilchrist in 1896 [27] reported 2 cases with excellent clinical and histopathologic descriptions. Granting that these authors were not certain whether the organism was animal or vegetable, the reports they made nevertheless were otherwise accurate and of permanent value.

However, going back to 1892 one finds that Wernicke,[28] *Professor der Allgemeinen Pathologie,* Buenos Aires, Argentina, studied sections submitted to him by his student, Posadas, supposedly from a patient suffering from mycosis fungoides. The question mark after the term "mycosis fungoides" in the title indicates the doubt present in the mind of Wernicke as to the correctness of the diagnosis. Moreover, the excellent photomicrographs and the repeated mention of the term Coccidioides make it certain that the case was one of infection with Coccidioides of the South American type. Strangely enough, Posadas [29] eight years later reported a case in which autopsy had been performed. He had had the case under observation for seven years but made no mention of Wernicke's work. The description of the case leads one to assume that Posadas' case was the same one Wernicke had originally reported. If one takes a mean between 1892 and 1900 one has the date 1896; therefore, if Rixford and Gilchrist are not the "coccidioidal doubles champions" they are at least the runners-up for this honor.

Final and comprehensive development of the subject was delayed until 1901, when Ophüls [30] gave the dermatologic world the results of his investigations.

Rocky Mountain spotted fever was officially recognized as a national menace by George M. Sternberg,[31] the Surgeon General of the United States army, in 1896. In his report the Surgeon General took cognizance of the seriousness of the disease, reviewed various theories as to its cause and included the reports of some ten local physicians. The work of Ricketts,[32] who gave his life to the investigation of Rocky Mountain fever and of typhus fever, will stand for all time as a monument to American medicine.

By way of relaxation before taking up further problems in priority, I mention a paper entitled "Bath Pruritus" by Stelwagon.[33] All will

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27. Rixford, E., and Gilchrist, T. C.: Johns Hopkins Hosp. Rep. **1**:209, 1896.
28. Wernicke, R.: Centralbl. f. Bakt. (Abt. 1) **12**:859, 1892.
29. Posadas: Rev. de chir. **20**:277, 1900.
30. Ophüls, W.: J. Exper. Med. **6**:443, 1905.
31. Sternberg, G. M.: Rep. Surg.-Gen. Army, Washington, 1896, p. 60.
32. Ricketts, H. T.: The Study of "Rocky Mountain Spotted Fever" (Tick Fever?) by Means of Animal Inoculations: Preliminary Communication, J. A. M. A. **47**:33 (July 7) 1906.
33. Stelwagon, H. W.: Philadelphia M. J. **2**:863, 1898.

agree that the condition described is a definite entity and that there is no controversy as to who arrived first in this field.

Nor do we have to concern ourselves about priority in the discovery of sporotrichosis. I have always associated the name of Schenck [34] with sporotrichosis, but as I came along down the years in this little investigation into priorities I had an idea in the back of my mind that there was a "catch" in this contribution as in so many of the others. "When I get around to it," I said to myself "I will dig out some article published before 1898." My thumb, however, became sore in my fruitless search for references, and I gave up.

Looking over my dates, I am delighted to find another easy one. In 1890 Schamberg [35] read a paper on his observation of a now well known pigmentary disturbance of the skin of the legs.

Beneath this reference I found another one to Schamberg.[36] "Epidemic of an Urticaroid Dermatitis Due to a Small Mite (Pediculoides Ventricosus) in the Straw of Mattresses" was written by Schamberg and Goldberger.[37] This seemed conclusive, but a paper entitled "Priority among American Physicians in Demonstrating the Cause of Grain Itch," by Kittredge,[38] was published in 1936. I quote:

> Pediculoides ventricosus was first recovered from a lesion of grain itch, at any rate in the United States, by Dr. Lyman Talmage Rawles [39] on May 14, 1909. The first American demonstration that Pediculoides ventricosus is the cause of grain itch was made by Rawles on May 14, 1909. The second American demonstration that Pediculoides ventricosus is the cause of grain itch was made by Drs. Jay Frank Schamberg and Joseph Goldberger between June 9 and June 21, 1909.

In the literature for 1900 I find a contribution the author of which shall remain nameless.

> The removal of hair by this method [x-ray] is attended by no disagreeable sensations and by no accompanying symptoms beyond at times a slight erythema or pigmentation lasting a short time. The skin, after the removal of the hair, is left in the same condition as before, except for the absence of the hair. There seems every reason to believe that in x-rays we have an agent of the utmost value for the removal of hair.

The originator of the Tricho method may have been inspired by this article, but in 1900 no one could possibly have foreseen the result of roentgen ray epilation.

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34. Schenck, B. R.: Bull. Johns Hopkins Hosp. **9**:286, 1898.
35. Schamberg, J. F.: Brit. J. Dermat. **13**:1, 1901.
36. Schamberg, J. F.: Philadelphia M. J. **8**:5, 1901.
37. Goldberger, J., and Schamberg, J. F.: Pub. Health Rep. **24**:973, 1909.
38. Kittredge, H. E.: Priority Among American Physicians in Demonstrating the Cause of Grain Itch: Tardy Credit Therefor Given to Dr. Lyman Talmage Rawles, J. A. M. A. **107**:2109 (Dec. 26) 1936.
39. Rawles, L. T., and Ray, Herbert A.: J. Indiana M. A. **3**:351, 1910.

Some of the most valuable contributions have been buried by publication in obscure places. Pollitzer [40] complained bitterly because his early comments on xanthelasma were overlooked as a result of publication in a little known journal.

> This ingenious theory of Unna's has the one great merit of clearly recognizing the fact that the so-called "Xanthoma-cell" is not a cell at all. My own paper on this subject, perhaps on account of the unwise publication in a local New York Journal, has generally escaped the attention of the writers of text books who have made only the most casual references to it or have ignored it entirely.

Most of the textbooks accept the theory of xanthoma of the eyelids set forth in Pollitzer's paper, but Weidman and Freeman [41] proved that, in their studies at least, degeneration of the muscle fibers had nothing to do with the disorder.

Notwithstanding the fact that it was published in an obscure journal, Engman's [42] paper entitled "An Infectious Form of Eczematoid Dermatitis" has taken its place as a valuable original contribution to dermatology.

Fox-Fordyce disease [43] requires no comment, as it is universally recognized as an entity and needs only to be recorded as originally observed in 1902.

No one therapeutic agent has been of more value or has been used as much in dermatology as solid carbon dioxide. For this and many other services to dermatology we should give Dr. William Allen Pusey [44] a vote of thanks.

The first clinical and histopathologic report on paraffin prosthesis was read by Heidingsfeld [45] at the thirtieth meeting of the American Dermatological Association in Cleveland, in 1906. Fortunately the injection of paraffin and petrolatum seems to have been discontinued, and it is to be hoped that we shall not be called on to struggle with such methods in the future.

Although it is necessary because of time limitations to end this compilation with the beginning of the last quarter-century, one more contribution remains to be included. In 1912 Bowen [46] described "pre-

40. Pollitzer, S.: J. Cutan. Dis. **28**:633, 1910.

41. Weidman, F. D., and Freeman, W.: Xanthoma Tuberosum: Two Necropsies Disclosing Lesions of the Central Nervous System and Other Tissues, Arch. Dermat. & Syph. **9**:149 (Feb.) 1924.

42. Engman, M. F.: St. Louis Cour. Med. **27**:401, 1902.

43. Fox, G. H., and Fordyce, J. A.: J. Cutan. & Genito-Urin. Dis. **20**:1, 1902.

44. Pusey, W. A.: The Use of Carbon Dioxid Snow in the Treatment of Nevi and Other Lesions of the Skin, J. A. M. A. **49**:1354 (Oct. 19) 1907.

45. Heidingsfeld, M. L.: J. Cutan. Dis. **24**:513, 1906.

46. Bowen, J. T.: J. Cutan. Dis. **30**:241, 1912.

cancerous dermatoses." By way of good measure he tossed into the same paper a demonstration, which was a confirmation of the work of Spencer and others, that the so-called psorosperms of Darier are dyskeratotic cells and not psorosperms. Although the term "cancerous dermatoses" would be a more fitting title, "Bowen's disease" is definite and is understood by all.

In leaving the last quarter-century to others for evaluation it is unnecessary to say that in this period an enormous increase in the quantity and quality of investigative work has occurred. With the organization of the American Academy of Dermatology and of the Society of Investigative Dermatology one may safely predict that an impetus not unlike that which occurred in the early seventies will be given to spur on the many young, energetic and original-minded American dermatologists..

CUTANEOUS ERUPTIONS AMONG INDUSTRIAL WORKERS

A REVIEW OF TWO THOUSAND CLAIMS FOR COMPENSATION

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NOTE.—*This article and the four which follow were read before the American Dermatological Association in a symposium on industrial dermatoses.*

Dermatologists have always been cognizant of the deleterious effect of occupational exposure on the skin. Since the passage of the Massachusetts Workmen's Compensation Act, in 1912, however, industry in that state has itself encouraged physicians to take concerted action in the study of these effects. As additional states include occupational dermatosis in their legislation for compensation, interest in this field rapidly increases.

It is the purpose of this paper to present the outstanding factors and conclusions indicated by a study of 2,000 cases of cutaneous disease arising in industry observed by me during the last six years, with special emphasis on those determined to be of occupational origin and therefore compensable under the Massachusetts law. Distribution of occupational disease by industries will then be summarized, and in conclusion methods of prevention will be outlined and a program for future action recommended.

To determine accurately the incidence of cutaneous disease in industry is an impossible task, owing to the extremely variable interpretations of statistics and the lack of an adequate terminology. The records of hospital clinics for the most part show a low percentage of occupational dermatoses, perhaps because of the difficulty of obtaining complete histories. In a clinic in a neighboring state whose compensation laws did not include such diseases, in only 394, or 9 per cent, of 4,580 cases recorded in three years was the cutaneous disease listed as a dermatosis—in 215 as dermatitis venenata and in 179 as unclassified dermatitis—and in not one of these was it described as of occupational origin. A careful study of these cases might have revealed some of occupational source, and they could have been listed properly if a suitable term for this type of injury had been available.

I proposed the use of the term "ergodermatosis" [1] (ἔργον, "work," and δέρμα, "skin") in 1935, when three physicians were appointed as

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Read at the Sixty-First Annual Meeting of the American Dermatological Association, Inc., Del Monte, Calif., June 11, 1938.

1. White, R. P.: The Dermatergoses, ed. 3, London, H. K. Lewis & Co., Ltd., 1928.

"medical referees," and I again urge it on the medical and the legal profession as both inclusive and descriptive. "Ergodermatosis" may be defined in the words used by a Massachusetts court in describing personal injury as "any injury, damage, or harm or disease (of the skin) which arises out of and in the course of employment." [2] Under the Massachusetts Compensation Act such injury is compensable if it originates in the course of employment, causes incapacity and takes away a worker's ability to earn wages. These facts must be determined by an industrial commission and not by physicians.

Dermatologists, having become interested and more fully informed concerning the prevention and diagnosis of occupational cutaneous disease, are in turn receiving the close attention and cooperation of industrialists, who have learned that prevention and early detection are much cheaper than indifference and neglect and have come to realize that new chemicals must not be introduced at the expense of the worker's health. On the other hand, there is probably no inorganic or organic element to which no one is sensitive, and such idiosyncrasies will continue to swell the ever growing list of so-called occupational irritants. Yet, while it is unfair to condemn a process merely because of the peculiarities of one person, every outbreak should be thoroughly investigated, for the hypersensitive person may constitute the warning signal of a whole series of reactions, and careful study of his condition may be the means of preventing many similar eruptions.

When a cutaneous disease develops in an employee two questions must be decided without delay: 1. Is the disease contagious? If it is, the worker may infect others. 2. Is it occupational? If so, the work may affect other employees. The dermatologist, with his knowledge of the endogenous and exogenous sources of cutaneous eruptions, is the logical person to answer these questions. Whenever possible the finding must carry a certain degree of probability, for opinions as to possible occupational origin or as to idiosyncrasy or individual susceptibility are of little value in determining the ultimate disposal of the case, especially as regards compensation. Either a definite opinion should be expressed, or its impossibility should be admitted. The opinion should be given only after thorough history taking, a complete physical examination, careful patch testing when indicated, the necessary laboratory procedures—even consultation with other physicians, plant sanitary engineers and chemists—and inspections of working conditions in the plant concerned. Lastly, an opinion, once given, should be based on data reliable enough to withstand cross examination. Insurers will rarely refuse to make expenditures necessary for a positive answer to the industrial problem presented.

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2. Johnson case, 217 Mass. 388.

Of the 2,000 private cases covered by this report, the disease was diagnosed in 1,004 as occupational in origin and in 845 as nonoccupational. In 85 cases a definite opinion could not be expressed, and in 66 the patient was sent to me with a healed eruption, so that I might determine whether or not he was in a condition to resume his work. These figures do not include cases encountered during the inspection of employees at various plants, and many of the cases were those of affected workers selected from groups for testing.

TABLE 1.—*Distribution of Nonoccupational Diseases of the Skin*

Diagnosis	No. of Cases	Diagnosis	No. of Cases
Dermatophytosis	179	Neurodermatitis	4
Impetigo contagiosa	88	Pediculosis	4
Dermatitis venenata	83	Tinea versicolor	4
Scabies	65	Ichthyosis	3
Psoriasis	59	Insect bites	3
Seborrheic eczema	34	Alopecia areata	3
Erythema multiforme	30	Dermatitis herpetiformis	2
Pityriasis rosea	24	Erythema nodosum	2
Furunculosis	21	Granuloma pyogenicum	2
Urticaria	19	Parapsoriasis	2
Verruca	18	Tuberculosis cutis	2
Dermatitis medicamentosa	16	Acne varioliformis	1
Acne vulgaris	14	Carbuncle	1
Herpes simplex	14	Chickenpox	1
Dermatitis factitia	13	Chondrodermatitis nodularis helicis	1
Infectious eczematoid dermatitis	10	Ecthyma	1
Paronychia	9	Epidermoid carcinoma	1
Herpes zoster	8	Erythema induratum	1
Lichen planus	8	Leukoplakia	1
Syphilis (prim. 1, sec. 4, ter. 3)	8	Molluscum contagiosum	1
Ulcers	8	Naevus araneus	1
Acne rosacea	7	Onycholysis	1
Injuries	7	Onychomycosis	1
Sycosis vulgaris	7	Pellagra	1
Angioneurotic edema	6	Pernio	1
Varicose eczema	6	Pityriasis rubra pilaris	1
Acne keloid	5	Pyoderma	1
Epithelioma	5	Pruritus senilis	1
Keratosis plantaris et palmaris	5	Purpura rheumatica	1
Dermatitis exfoliativa	4	Rhinophyma	1
Erythema simplex	4	Scarlet fever	1
Hyperhidrosis	4	Sebaceous cyst	1
Lupus erythematosus	4	Urticaria pigmentosa	1

NONOCCUPATIONAL DISEASES

The list of nonoccupational diseases shown in table 1 resembles that of the average hospital clinic, with dermatophytosis, impetigo contagiosa, scabies and psoriasis predominant. Less than 3 per cent of these cases were disputed by the worker or the insurer and thus became subject to hearing by the Industrial Accident Board. The average worker, especially a tradesman, is anxious to continue his employment and is relieved to know that it is not the cause of his condition. The diagnosis should be explained to him in detail and an offer made to inform his family physician regarding the diagnosis and to give him suggestions for treatment.

Nonoccupational dermatophytosis (179 cases in this series) is disputed by workers less often than one would expect, for the patient is

usually aware that the infection started on an unexposed area, such as the feet; often knows or suspects the diagnosis; has had previous attacks; knows of no irritants in his work, and is frequently seeking advice rather than compensation.

Fungous infections with eruptions on the hands are usually accepted by insurers for compensation if the work involved contact with irritants, for they aggravate the condition, and aggravation is compensable; the difficulty then lies in determining the extent and duration of the aggravation.

Pyogenic infections, including infectious eczematoid dermatitis (10 cases), present extremely difficult problems requiring careful history taking, especially as to trauma and industrial exposure. While it is true that most occupational dermatoses are of the eczematous type, hazards vary as to the cutaneous responses they elicit, and, with some exceptions, each worker in a particular trade gives a fairly consistent history of the site and character of the onset and presents an eruption which is fairly characteristic of the given trade and exposure. Experience will help to determine whether a shoe worker's eruption, for example, was acquired from his trade or from contact with plants at his home or elsewhere.

Diagnoses of nonoccupational dermatitis venenata are not difficult to make, and only 1 of the 83 cases in this series was made a subject of hearing. Dishwashing is an admitted hazard, but 3 dishwashers continued their work when it was proved to them that their dermatitis was due in 1 case to a rayon shirt, in another to eyeglass frames and in the third to a wrist watch.

The diagnosis of dermatitis factitia is rarely made, and one must be ready to substantiate it. In this series the incidence of that condition was low—13 cases, or 0.6 per cent.

In cases of syphilis there were active lesions not localized at sites of trauma, which were classed as nonoccupational, since only the localization of a systemic disease by trauma is compensable. A routine positive Hinton or Wassermann reaction of the blood is always embarrassing to a dermatologist; reporting it to an insurer may start a rumor which will reach the employer, with subsequent discharge, despite the dermatologist's protestation of noninfectiousness; fellow workers may learn of the patient's condition, and this knowledge may precede him in his search for reemployment. Instead of notifying the insurer, it is better to inform the employee of his condition and to make sure that he has reported to his family physician for observation and treatment if necessary.

This list of nonoccupational cutaneous eruptions, comprising sixty-six different diseases, is presented not as a standard list but as a summary of the conditions in individual cases which from a careful

study of the working conditions were found to have no direct or indirect occupational origin.

OCCUPATIONAL DISEASES

Industry today is so complex that a tabulation of dermatoses by occupations is bound to be inaccurate. The task has been attempted in the excellent reference work entitled "Occupation and Health," [3] and the trade grouping there adopted has been followed as far as possible in this presentation.

1. *Age and Sex.*—There were many more men than women in our series of cases of occupational dermatosis—778 men (78 per cent) and 226 women (22 per cent). There were fewer women over 35 than

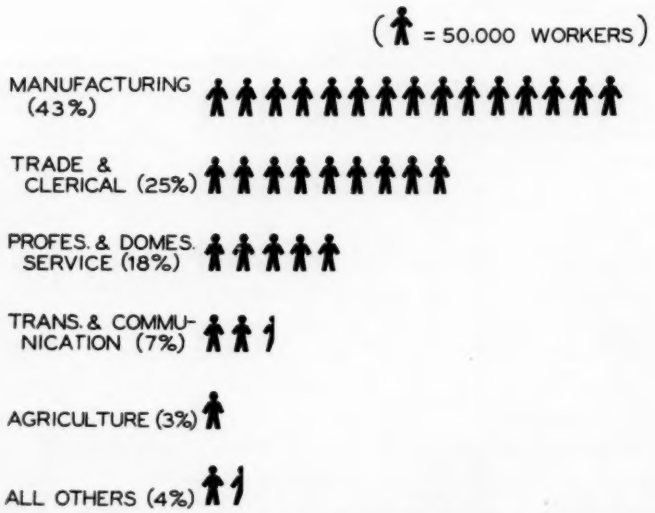

Chart 1.—Distribution of gainful workers in Massachusetts in 1930.

men. The sex distribution of gainful workers in Massachusetts (608,316 men and 164,977 women) is presented merely to show its approximate relation to that in this series. It should be noted that some of the women whose cases are included were persons not employed in industry proper, such as hotel and restaurant workers, building cleaners and caretakers (included in the federal census figures of chart 1 as in professional and domestic service) and public utility service workers.

Young untrained workers were the most susceptible to occupational dermatitis, the largest number of cases (223) occurring between the ages of 20 and 25. Persons of these ages are less experienced and are apt to be careless in the handling of irritants. They are also more prone

3. Occupation and Health: Encyclopedia of Hygiene, Pathology and Social Welfare, International Labour Office, Boston, World Peace Foundation, 1930.

than older persons to engage in the hazardous phases of industry. Not only were there a greater number of cases among younger employees, but by percentage the incidence was much higher there; that is, there were many more cases per hundred younger workers than per hundred older ones. It may be assumed that this indication of my figures is accurate and that the relative rates between age groups are approximately correct.

The most diffuse eruptions, however, were seen in older employees, who in general are highly resistant to treatment and often suggest a constitutional background that predisposes them to cutaneous disease. Such cases should be carefully studied for this possible internal predisposing factor.

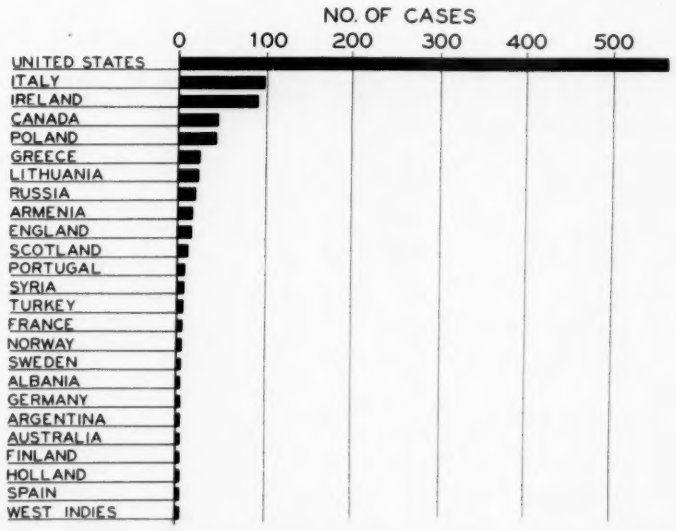

Chart 2.—Distribution of 1,004 cases of occupational dermatitis according to the place of birth of the patient.

It goes without saying that the ideal picture of the incidence of occupational dermatitis would be based on the actual number of persons, by age groups, exposed to a given hazard.

2. *Nationality.*—It is interesting to note that the Italians, a dark-complexioned race, predominated in the acquiring of cutaneous eruptions; the disease was often severe and persistent, perhaps because of some dietary factor. As shown in chart 2, they lead the list of foreign-born patients, with 97 cases, followed by the fair-complexioned Irish, with 91. These figures gain a special significance because in Boston, whence most of my cases were drawn, Irish outnumber Italians by nearly 2 to 1.

Foreign-born patients comprised nearly half (446) of this series. This ratio corresponds approximately to that of native to foreign-born gainful workers in Massachusetts industry.

3. *Location of Eruptions.*—In regard to the relative frequency with which various parts of the body were affected, about 9 per cent of all eruptions were distributed in small areas over miscellaneous regions, such as the neck and the back. The following percentages were derived from splitting up cases in which more than one part of the body was affected and distributing the data anatomically. The hands (47 per cent) were most frequently involved, followed by the fingers (13 per cent), forearms (7 per cent), the feet and legs (each, 5 per cent), the face (4 per cent) and the arms (2 per cent).

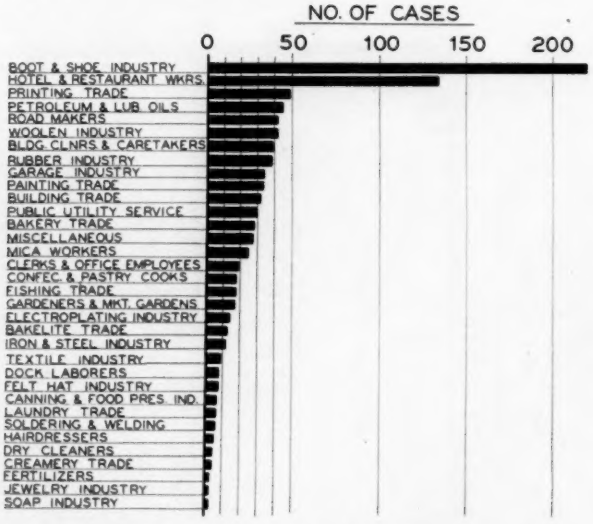

Chart 3.—Distribution of 1,004 cases of occupational dermatitis according to occupation.

4. *Duration of Eruptions.*—A question frequently asked at hearings of the Industrial Accident Board is: How long does an occupational dermatitis persist? The duration of an occupational dermatitis may depend on the initial treatment. In Massachusetts the worker may select his own physician for the first two weeks, and then he is referred to a clinic; thus, the patient may be treated by several physicians for several weeks before he is referred to a dermatologist. This was true in many of the cases reported. Insurers are now learning that it is well to refer patients as soon as possible to a specialist for diagnosis and treatment. Of 739 patients who received treatment, 18 per cent were cured in less than two weeks, 39 per cent in less than one month, 79 per cent in less than three months, 93 per cent in less than eight

months and 98 per cent in less than one year. The total disability in these cases amounted to six thousand and ninety-one weeks, or an average period of disability per worker of approximately six weeks. In 2 cases the disease lasted two years and in 1 it has continued for four years and at the present writing is still under treatment.

When an eruption has cleared and does not recur for a reasonable time, if the patient returns to work and has another attack it is considered a new injury; if he returns to work before it is healed a new attack constitutes a recurrence, for which the original insurer is liable. This is an important point in the eyes of an industrial board. For statistical purposes all later outbreaks are listed as recurrences, although most of them should be listed as instances of injury. All patients with such recurrences in this series were discharged relieved. Of them, 119, or 16 per cent, returned to work and suffered new outbreaks or recurrences; 58, or 49 per cent, had a second attack; 41, or 34 per cent, had three attacks; 14, or 12 per cent, had four; 4, or 3 per cent, had six, and 2 had eight. The duration of these outbreaks is interesting. Thirty-two per cent lasted from three to seven weeks; 43 per cent from eight to twelve weeks, and 25 per cent from thirteen to twenty weeks. No outbreak lasted longer than twenty weeks. This suggests that in the group in which one attack did last longer than twenty weeks some factor other than the occupation was responsible for the prolongation of disability.

When a dermatitis alleged to be occupational lasts longer than three months, with no exposure to the original contact, and shows no evidence of secondary infection, several factors must be considered. The physician should question the correctness of the diagnosis and of the type of treatment adopted, the patient's environment and his dietary regimen. An investigation should be made to discover whether the patient is carrying out instructions or is doing some outside work. He may be intentionally or unintentionally prolonging his eruption or have a congenital or acquired polysensitivity.

Hospitalization is often the solution of this problem. All treatment should be stopped, the skin bathed with physiologic solution of sodium chloride or mild boric acid solution and a sterile oil dressing applied. The patient should be closely observed, and in less than a week improvement will be noted if overtreatment, environment or malingering has been the causal factor. However, if there is no response, complete rest, regulation of diet and nursing will often accomplish a cure if the patient is cooperative.

If there is a recurrence immediately after discharge from the hospital, environment or malingering is surely to blame. Having observed the patient for more than three months, the dermatologist has probably

formed an opinion as to whether he is a possible malingerer. If he is, rehospitalization with a fixed occlusive dressing may solve the problem.

Roentgen treatment should never be employed unless one is certain that the patient is not a malingerer. Secondary infections may be treated with autogenous vaccines. Pathogenic fungi are rarely observed in cultures, but one frequently encounters a combination of Staphylococcus aureus and an anhemolytic streptococcus.

In some cases the condition defies all attempts at cure. However, the promise of a lump sum in compensation occasionally has a magical effect, for the members of the Industrial Accident Board are unwilling to approve such a settlement unless the patient's skin is in such condition as to permit his returning to some kind of employment. On the other hand, if in spite of the patient's improvement the insurer refuses to pay an amount satisfactory to the patient, there may be an adverse mental effect on the patient, resulting in a fresh outbreak of his dermatitis.

5. *Special Factors.*—The importance of soap and water as a causal factor in occupational dermatitis was amply demonstrated in this study. Not only were dishwashers, as shown in the section on occupational distribution, seriously affected by the chemical ingredients of the soap and by having their hands constantly wet, but workers in industry in general often sustained eruptions from the soap furnished them for cleaning up at the end of the working day. In at least 249 cases soap and water constituted a contributing factor in the production of an eruption. These cases were distributed as follows:

Hotel and restaurant workers	117
Building cleaners	37
Painters	32
Rubber spreaders	20
Wool washers	17
Creamery workers	11
Car washers	7
Printers	7
Clerks	1

The commonest detergent mentioned was said to contain 8 per cent soap of the hand laundry type, 7 per cent fatty acid, as an animal fat, and 80 per cent carbonates, mostly sodium carbonate.

Plant poisoning was a serious factor, causing 67 disabilities, mostly among gardeners and road makers.

6. *Statistics of the Industrial Accident Board.*—Before taking up the separate industries in relation to outbreaks of occupational dermatitis, it may be well to present figures covering the activity of the Massachusetts Industrial Accident Board for one year (June 1936 to June 1937).

A total of 224 cases of dermatitis were handled in this period. One hundred and seventy-six patients were men, and 48 were women. Only 12 persons were given hearings. The ages ranged from 16 to 69, with the largest number (48) between 20 and 24 and only 8 of 60 years or more.

The total amount of compensation paid during the year was $22,742.27. Of this sum, $5,572.34 was paid in lump sums to 30 persons in amounts ranging from $25 to $500, and $17,169.93 was awarded in the form of weekly compensation. The average payment for one week was $11.57 and for seven weeks $80.99, as compared with an average wage of $20.05 and $140.34 for the respective periods. The total period of disability amounted to one thousand, four hundred and sixty-four weeks and four days, or an average period per worker of approximately seven weeks.

The figures just given include only the cases disposed of during the twelve months covered and do not include those which were carried through the year and not concluded within it.

OCCUPATIONAL DISTRIBUTION

A report is now presented of the various industries and occupations, together with relevant data. For complete statistics, the reader is referred to tables 2 to 6.

It will be noted that the major incidence was in the boot and shoe industry. This was to be expected, since this is one of the largest industries in Massachusetts. Since a large proportion of the gainful workers of the state are employed in this industry, the incidence of occupational dermatitis is not necessarily higher in a relative sense than it is in some of the other groups in which workers suffered eruptions. It being difficult to establish rates of incidence in the various occupations, the material in table 2 should be considered as constituting a graphic representation, and conclusions as to the relative degrees of hazard in the several occupations should not be drawn from it. As a matter of fact, the electroplating industry, appearing far down the list, would show a higher rate of eruptions in proportion to the number of employees exposed than any other industry.

One further observation must be made: While the percentage of workers in professional and domestic service is fairly small, there was a much higher relative number of occupational eruptions among them than in the strictly industrial branches of employment.

1. *Boot and Shoe Workers.*—Workers engaged in the manufacture of boots and shoes are exposed to hazards in the form of chemicals used in cleaning, bleaching, cementing, staining and finishing; under this heading also are included those who prepare the leather—the

tanners. These workers are exposed to heat, dust, acids, alkalis, volatile organic solvents and various dyes and pigments. Treers [4] are subjected to the desiccating action of the cleaners, which include ether, naptha and benzene; to aniline dyes and stains, which are applied with cloths or sponges, and lastly to the heat of the iron used to smooth the leather. A fairly characteristic eruption consists of dryness, infiltration and fissuring of the skin of the tips of the first, second and third fingers, usually on the right, with erythema and edema of the paronychial folds and separation of the free borders of the nails; pinhead-sized vesicles arise on the lateral aspects of these digits and the eruption

TABLE 2.—*Distribution of 1,004 Cases of Occupational Dermatitis According to Occupation*

Boot and shoe workers		
Treers	106	
Tanners	47	
Cementers	22	
Dressers	20	
Hand lasters	8	
Edge trimmers	4	
Hand stitchers	3	
Dressing mixers	2	
Heel scourers	2	
Cutter	1	
Glazer	1	
Marker	1	
Tack maker	1	
Sock liner	1	
		219
Hotel and restaurant workers		
Dishwashers	55	
Salad makers	20	
Soda fountain clerks	19	
Bartenders	13	
Silver polishers	9	
Meat cutters	7	
Food handlers	6	
Cooks	2	
Housemen	2	
Chambermaid	1	
		134
Printers		
Lithographers	22	
Compositors	10	
Roller cleaners	7	
Photoengravers	7	
Bookbinders	2	
Etcher	1	
		49
Petroleum and lubricating oil workers		
Machinists	33	
Automatic machine workers	27	
Valve makers	3	
Bolt threader	1	
Gear cutter	1	
Solderer	1	
Drivers	4	
Gasoline attendants	3	
Pipe line repairers	3	
Helper	1	
		44
Road makers		
Laborers	42	

spreads over the entire hand and later to the other hand. Further extension depends on the person and the degree and extent of the exposure. Forty-seven tanners presented lesions varying from sharply punched-out ulcerations, with fissures on the hands, to diffuse erythematous and edematous plaques on the arms, the lower parts of the legs and both iliac regions, which rapidly became infiltrated, lichenified and excoriated. These workers are exposed to strong alkalis and acids, including the various chromates. Cementers, who apply an adhesive material to heels and soles and paste inner linings, contact carbon

4. Downing, J. G.: The Skin and the Compensation Law in the United States (Treer's Dermatitis), in Deliberationes Congressus dermatologorum internationalis, Leipzig, Johann Ambrosius Barth, 1936, vol. 2, pp. 210-216.

disulfide, rubber cement, benzene, naphtha, ethyl acetate (used to soften cement), methanol and methyl acetate and trichlorethylene. Pasters of inner linings show a characteristic eruption on the dorsum of the second and third fingers and the fourth metacarpophalangeal joint. Dressers show a vesicular eruption starting on the first, second and third right fingers. Trimmers are exposed to inorganic and organic dusts. In other workers specific sensitivities to certain kinds of leather and to dyes and powders develop.

2. *Hotel and Restaurant Workers.*—The hazards in the hotel and restaurant business are alkalis and water, the empolyees affected being those whose hands are constantly wet. Most dishwashing is done by machinery, but workers prepare the washing mixtures by adding soap by hand or in cups to the water and wash glasses, silver and pots and pans by hand. These employees are elderly men of poor physical condition, who rarely show fungous infections of the feet, while soda fountain clerks are youths, many of whom have dermatophytosis of the feet or groin. Bartenders show persistent paronychia; silver polishers clean silver and brass and their hands become dry, hyperkeratotic and fissured. Food handlers are those cleaning and preparing fruit and vegetables; their hands are constantly wet, and sensitivity to various foods develops. One became so sensitized to peaches that the merest contact caused an eruption.

3. *Printers.*—In the printing trade lithographers showed an eczematous dermatitis from exposure to chromates. Machine minders acquired it from cleaning with kerosene; photoengravers, blueprinters and others, from the various acids, and bookbinders, from the glue.

4. *Petroleum and Lubricating Oil Workers.*—Petroleum and lubricating oil workers include those exposed to gasoline and cutting oils. The drivers are affected by the process of filling trucks, when they peer into the tanks, or by overflows which saturate their clothing, which they neglect to change. Thirty-three machinists showed various types of lesions, according to the work engaged in and the kind of oil used. Most cutting oils are neutral petroleum oils with occasionally a slight amount of free sulfuric acid; others are compounds of petroleum oil in an alkaline, soapy solution. Men assembling small parts work with their hands close together, and they present erythematous, dry fissured hands, for they are constantly bathed in oil; in the assembly of large pieces, on the other hand, the oil splashes on the forearms and face, on which occurs folliculitis with papules, pustules and an occasional furuncle.

5. *Road Makers.*—Road makers suffer mostly from contact with plants, but occasionally from handling creosote, pitch and tar blocks.

6. *Workers in the Woolen Industry.*—Woolen industry employees who were studied included washers, dyers, machinists, a wet finisher, a twister, a weaver and a cloth examiner. The last 4 exhibited a marked sensitivity to the wool itself. The chemicals commonly used in this industry are formic acid, sodium bisulfide, acetic acid and sodium bichromate.

7. *Building Cleaners and Caretakers.*—Building cleaners are mostly women who sweep, scrub and polish and in so doing come in contact with soap powders, lye, insecticides, sawdust and floor waxes.

TABLE 3.—*Distribution of 1,004 Cases of Occupational Dermatitis According to Occupation—Continued*

Woolen workers	
Washers	18
Dyers	16
Machinists	3
Wet finishers	2
Cloth examiner	1
Twister	1
Weaver	1
	42
Building cleaners and caretakers	
Cleaners	31
Janitors	8
	39
Rubber workers	
Spreaders	20
Mixers	5
Rubber mill operators	3
Rubber heel trimmers	2
Caser	1
Cementer	1
Curer	1
Cutter	1
Compound weigher	1
Laminator	1
Packer	1
Watchman	1
Machinist	1
	39
Garage workers	
Auto mechanics	15
Body workers	8
Car washers	6
Shippers	2
Battery maker	1
Garage cleaner	1
	33
Painters	33
Builders	
Cement mixers	10
Laborers	7
Carpenters	6
Bricklayers	3
Plasterers	2
Steam fitters	2
Draftsman	1
Hod carrier	1
	32

8. *Rubber Workers.*—In the rubber industry, changing processes to remove hazards has had good results; a Boston firm was enabled in this way to dispense with the services of its industrial hygienist, who by his own account had no more industrial disease to treat. The reclaiming of old rubber, however, requires strong compounds—for example, phenylhydrazine—to break it down, and susceptible persons are affected. There are jobs such as that of the spreader, who dips his hands into a soap mixture, picks up a mass of soft rubber and spreads it on cloth in a machine which turns out rubberized cloth. Spreaders suffer from edema, infiltration and fissuring of the fingers, with separation of all the free borders of the nails, and, after continued exposure, from erythema and edema of the face, arms and legs.

9. *Garage Workers.*—Among garage workers, automobile mechanics are affected by oil and gasoline; body workers, by dust encountered while sandpapering old paint and by the fumes of muriatic acid and flux; car washers, by soap and water, and helpers by gasoline used in cleaning and removed from tanks. Gasoline produces in a sensitive person an eruption consisting of erythema with grouped vesicles on the body and extremities. This type of eruption usually appears in indoor workers who continue to wear clothes which have been soaked with gasoline. Gasoline applied to their skins gives a positive reaction without an occlusive dressing.

10. *Painters.*—Painters doing outside work are rarely affected by occupational dermatitis; in fact, in the spring men under treatment for a dermatitis have been able to do outside work, with proper instructions, without an exacerbation; however, the eruption is sure to flare up on their return to inside work. From the point of view of occupational disease they may be included with building cleaners, for they suffer from the same irritants, with the added factor of paint solvents, stains, creosote and the scrapings of calcimine and old paint.

11. *Builders.*—In the building trade the main hazard is cement. Ten cement mixers showed eczematous, edematous eruptions on the hands and arms, which in some cases spread to the face, neck and ankles, the skin later becoming infiltrated, lichenified and excoriated. Three bricklayers showed eruptions on the hands and face, and 1, in addition, had a similar eruption on the anterior aspect of the right thigh, opposite the pocket where he carried his pointing trowel, to which the wet clay clung. Two plasterers showed folliculitis; a steam fitter had three attacks of dermatitis, each of which followed his drilling holes through plastered ceilings. Six carpenters suffered from various woods, and a draftsman had repeated eruptions until he stopped using teakwood for making designs. Seven laborers suffered from contact with cement or with plants.

12. *Public Utility Service Workers.*—In the public utility service, the chief irritant is rubber gloves, which affected 20 linemen. An electric light bulb cleaner had an eruption on one hand from wearing a glove discarded by an affected lineman. Others suffered from plant poisoning, which is common among this group. These cases are readily recognized by company physicians and the patients are treated; they are not referred except when the eruption is severe. Two other employes suffered from cleaning light bulbs.

13. *Bakery Workers.*—Included with the bakers were a weigher of baking supplies and 2 cracker packers. That the enigma of baker's eczema will not easily be solved may be seen from the fact that in this group positive reactions were shown to rye, wheat, chocolate, coconut

oil, vanilla, cinnamon, butter flavoring, cream cake filling, salt, malt and a combination of sodium bicarbonate and citric acid. The weigher gave negative reactions to these individual ingredients but strongly positive reactions to various combinations of them.

14. *Miscellaneous Workers.*—The miscellaneous group includes workers coming in contact with irritants unusual to the routine day's work, such as shippers, packers, truck drivers, furnace men and those suffering from a dermatitis as the result of treating a superficial wound

TABLE 4—*Distribution of 1,004 Cases of Occupational Dermatitis According to Occupation—Continued*

Public utility service workers	
Linemen	20
Bulb cleaners (HCl)	3
Cable splicers	2
Cleaner (telephone sets)	1
Laborer (plants)	1
Pole inspector (ivy)	1
Telephone installer	1
Solderer	1
	30
Bakery workers	
Bakers	25
Cracker packers	2
Mixer (bakers' supplies)	1
	28
Miscellaneous	
Woodworkers	6
Chemists	2
Furnace men	2
Ice cream mixers	2
Nurses	2
Shippers	2
Tape makers	2
Bleach mixer	1
Bridgework maker	1
Color mixer	1
General worker	1
Glazier	1
Packer	1
Photographer (ivy)	1
Fur repairer	1
Shipper (druggets)	1
Truck driver (explosives)	1
	28
Mica workers	23
Clerks and office employees	
Clerks	6
Stenographers	4
Labelers	3
Office boy	1
Cashier	1
Envelop sealer	1
Salesgirl	1
Furniture polisher	1
Inspector of labels	1
	19
Confectionery and pastry cooks	
Chocolate dippers	5
Candymakers	3
Extract men	4
Pastry cooks	4
Cake sealer	1
Froster	1
	18
Workers in fishing trade	
Fish cutters	13
Fishermen	3
Fish packers	2
	18
Gardeners and market gardeners	
Florists	12
Laborers	6
	18

with iodine, mercury, hexylresorcinol or butesin picrate. The group included a fur repairer who was sensitive to black karakul and workers affected by the cleaners used to remove the daily grime.

15. *Mica Workers.*—Women who handle mica, a potassium-aluminum silicate, do so in making ornaments, screens and lamp shades by spreading on frames mica dipped into shellac. The shellac is dissolved in 10 per cent ammonia or in denatured alcohol; the latter is obtained by adding 5 parts of 85 per cent ethyl acetate and 1 part of high grade gasoline to 100 parts of pure ethyl alcohol and 5 parts of denaturing grade wood alcohol. These women's hands are constantly wet with the mixtures, and they suffer severe dermatoses.

This industry furnishes an interesting example of sensitization remaining after cessation of contact with an irritant. The employers formerly hired young Lithuanian women, who escaped a dermatitis at first, then married and on returning to work after a period of years acquired a dermatitis rapidly. This phenomenon may have been due to a loss of immunity acquired by repeated contact or to a lowered resistance due to age, pregnancies or intercurrent infections. However, the same phenomenon is seen in other types of workers after absence from work and is an argument against frequent changing of workers and the rotation of an employee's occupation.

16. *Clerks and Office Employees.*—Clerks and office employees as a class are not exposed to irritants, and patch tests with carbon paper, typewriter ribbons and hectograph inks have always given negative results; but 2 girls who used Ditto ink and applied a recommended protection cream before and after doing so suffered dermatoses of the backs of both hands. Patch tests with the ink and the cream gave negative results, but when the cream was used to remove the patch of ink a dermatitis resulted. Five clerks had an eruption on the fingers due to finger cots, 4 from glue and pastes, 1 from hand soap, 1 from furniture polish and the rest from treatment of minor injuries.

17. *Confectioners and Pastry Cooks.*—Confectioners and pastry cooks included 5 chocolate dippers who presented a fairly characteristic eruption involving the fingers, except the thumb and the distal half of the dorsum of one hand. Four men suffered vanillism from cleaning percolators; each of them had a series of attacks, growing increasingly worse until a severe one demanded treatment. Three candy makers had a dermatitis, 2 of them being affected by cinnamon; these 2 were treated twice in November for eruptions resulting from making Christmas candy, the second attack being caused by proximity to the fumes. A froster and a cake sealer had repeated attacks of dermatitis on returning to their work, although the cause could not be ascertained. Two pastry cooks reacted negatively to all substances individually but positively to a mixture of lard and salt.

18. *Workers in Fishing Trade.*—In the fishing trade cutters, fishermen and packers were affected. The cutters' eruptions varied from a typical eczematoid dermatitis, found also among the packers, to the erysipeloid and bullous lesions so well known. The fishermen showed lichenification of the lower half of the forearm over the radii or folliculitis of the wrists and neck due to their oilskins.

19. *Gardeners and Market Gardeners.*—Gardeners and market gardeners suffered from plant poisoning. Twelve florists and 6 planters and laborers were affected.

20. *Electroplaters.*—Electroplating involves exposure to many hazards, which include the degreasing process with boiling soda and potassium hydroxide. Eruptions among the skilled workmen in the industry generally mean loss of occupation.

21. *Bakelite Workers.*—In the bakelite industry 10 molders showed folliculitis over the lower ends of the radii and the anterior aspects of the wrists. Some become desensitized; others have an eruption for years but are able to continue work, while others have to give it up. One weigher was affected. Neither the bakelite, which is used as a powder, nor the finished product seems to affect the workers unless they are at the same time exposed to extreme heat. The girls who trim the molded ornaments suffer from innumerable cuts but show no other sign of dermatitis.

TABLE 5.—*Distribution of 1,004 Cases of Occupational Dermatitis According to Occupation—Continued*

Electroplaters	14
Bakelite workers	
Molders	12
Mixer	1
	13
Iron and steel workers	
Core makers	8
Molders	4
	12
Textile workers	
Awning stitchers	2
Coat maker	1
Cleaner	1
Dyer	1
Spooler	1
Upholsterer	1
Machinist	1
Printer	1
Silk snapper	1
	10
Dock laborers	
Longshoremen	9
Felt hat makers	
Stitchers	4
Flaggers	2
Dyer	1
Dipper	1
Twister	1
	9
Canning and food preserving workers	
Casers (sausages)	3
Coffee packers	2
Date packer	1
Meat packer	1
Vegetable packer	1
	8

22. *Iron and Steel Workers.*—The iron, pig iron and steel workers comprise molders or core makers (who make the molds which shape the interior of hollow castings); they come in contact with sand mixed with linseed oil or a gluten compound. The fingers of those working with the oil showed vesicles and some edema; the skins of those who used the gluten mixture became dry and fissured.

23. *Textile Workers.*—In the textile industry there was only sporadic sensitivity. Two awning stitchers suffered from different dyes, a spooler from the hand strap, an upholsterer from velour, and 1 cleaner from lye and another from cotton soaked in formaldehyde.

24. *Dock Laborers and Longshoremen.*—Dock laborers and longshoremen suffer from contacts with various substances through such work as shoveling ammonium sulfate, piling creosoted poles and han-

dling pickled hides. Generally only the test case is observed by the dermatologist, for the eruption clears up rapidly, so brief is the exposure.

25. *Felt Hat Makers.*—The felt hat industry has not only local but systemic hazards, the principal one being mercury; the workers most prone to dermatitis are the stitchers.

26. *Workers in the Canning and Food-Preserving Industry.*—Among workers in this industry there were casers of sausages and packers of coffee, vegetables, meat and dates.

TABLE 6.—*Distribution of 1,004 Cases of Occupational Dermatitis According to Occupation—Continued*

Laundry workers		**Dry cleaners**	5
Markers	2		
Washers	2	**Creamery workers**	5
Pressers	2		
Chauffeur	1	**Makers of fertilizers**	3
Machinist	1		
	8	**Jewelry workers**	
Solderers and welders		Cleaner	1
Toy makers	5	Polisher	1
Solderers	2	Solderer	1
Plumber	1		3
	8		
Beauty operators		**Soap workers**	
Hairdressers	4	Soap mixers	2
Facial masseurs	2	Laborer	1
	6		3

27. *Laundry Workers.*—The laundry workers included 2 markers sensitive to ink and a washer who had an eruption on the area covered by his rubber boots, to a patch test with which he gave a positive reaction.

28. *Solderers and Welders.*—Five novices in the toy industry who were careless with the flux, the usual irritant in this type of work, were affected. Automobile body workers should be included in this group.

29. *Beauty Operators.*—Hairdressers are affected by dyes and wave-setting preparations.

30. *Dry Clearers.*—Dry cleaning is now done mostly in closed receptacles, and the workers with dermatitis come from small establishments, where such apparatus is not in use.

31. *Creamery Workers.*—The creamery workers affected were washers who cleaned glass and machinery.

32. *Makers of Fertilizers.*—In the fertilizing industry the eruptions seen were due to contact with calcium cyanide.

33. *Jewelry Workers.*—The jewelry workers affected were cleaners of old jewelry, who used muriatic acid and sodium hydroxide.

34. *Soap Workers.*—In the soap industry the workers seen were affected by handling the finished product.

PREVENTION

Except for individual idiosyncrasies, there is no doubt that occupational dermatosis can be prevented. Hazards must be detected and eliminated. Mechanical devices should replace manual contacts, and where this is impossible gloves should be worn; where they cannot be, protective liquids or creams should be tried. The latter must be selected with extreme care, for they themselves can cause eruptions. Persons in contact with irritating dust should not use greasy creams, since these form an ointment with the poisonous dust, resulting in a continuance of the exposure. Greaseless creams may be used as a protection against petroleum and lubricating oils, and a solution containing equal parts of boric acid and alcohol applied before and after work. These creams are of possible value, but not in the presence of linseed oil, for this substance saponifies all cream, with resulting irritation. Castor oil mixtures are valuable, but the use of mild soothing solutions with a slight increase in p_H in the presence of acids and a decrease in the presence of alkalis, combined with improved personal hygiene, is of more service.

Workers exposed to irritants should be taught to clean their skin thoroughly at the end of the day, to apply an emollient at bedtime and not to wash it off before returning to work the following morning.

Periodic instruction to foremen is highly recommended. They should be taught the need of careful supervision of their men and women workers, so as to prevent them from discarding gloves and from using dangerous short cuts to speed up piecework, such as dumping articles into bowls of acids and removing them by hand instead of with a tool, as well as from using cloths and sponges in place of brushes.

Removing the worker from his job as soon as an eruption has developed, and giving that particular job to a succession of workers are not recommended. Instead, it is preferable to retain the employee at his work, in order to see whether an immunity to the poison concerned will develop, and possibly to desensitize him. On the other hand, if the first signs of an eruption appear at times of extreme fatigue or after excessive work, these may be the governing factors, and a change may protect him from a serious outbreak. As already pointed out in this paper, outbreaks are known to recur after absence from work, so that improvement in an employee's general condition after such a lapse of employment is not sufficient reason to put him back at his work after an interruption.

Hazardous processes, such as dry cleaning and blueprinting, should be enclosed whenever possible, and use should be made of the most modern equipment for this purpose. No new substances should be introduced into industrial processes until their possible effect on the workers has been thoroughly studied. In many instances dangerous chemicals are preferred to less irritating ones solely because of their lower cost; examples are benzene, which should be replaced by naphtha, and methyl alcohol, for which the less irritating ethyl alcohol can and should be substituted.

Lastly, no worker should be compelled or permitted to keep his hands wet with any solution for hours at a time, for few skins can withstand constant wetting, even with soap and water. Such jobs should be alternated during the day with those in which the hands may be kept dry.

PATCH TESTS

Contact or patch tests have already proved their value in solving many problems of occupational dermatitis. Used when indicated, correctly read and properly evaluated, they will continue to be advantageous; indiscriminately employed, they will soon be discredited.

Preemployment patch tests are not feasible, even when a hazard indispensable to the industry concerned is involved, for the method is not dependable. As has been demonstrated by Bloch,[5] sooner or later all persons can become sensitized to a known irritant. Negative reactions may impart a false sense of security, with resultant disaster. Application of chemicals under occlusive dressings for from twenty-four to seventy-two hours does not represent an ordinary industrial exposure. False positive reactions cause unnecessary rejection of applicants or needless expenditures to eliminate supposed hazards which in reality do not exist. False negative reactions are deceiving. It is impossible to test adequately for air-borne poisons, physical agents and their influence, trauma, powders and oils which interfere with bodily functions, or vital agencies, or to reproduce the ever changing chemical combinations of an industrial process or the prolonged contact day after day with weak solutions or steam. Dermatologists have all tested patients with an alleged irritant, obtained negative results and then observed a prompt outbreak on their return to work. With such clinical evidence, negative reactions to patch tests should be disregarded.

Straus's[6] experiments with infants showed that patch tests may sensitize human subjects thought to be immune. Why sensitize a large

5. Bloch, B.: The Role of Idiosyncrasy and Allergy in Dermatology, Arch. Dermat. & Syph. **19**:175-197 (Feb.) 1929.

6. Straus, H. W.: Artificial Sensitization of Infants to Poison Ivy, J. Allergy **2**:137-144 (March) 1931.

group of workers by preemployment patch tests with irritants to which they may never be exposed?

Routine testing is to be deprecated. Irritants appear unexpectedly. No matter how large a supply of test materials is on hand, it will not be sufficient; for example, a sudden outbreak of dermatitis in two shoe factories was found to be due to a single batch of white leather among twenty different types of such leather tested. Furthermore, it is impossible to learn the exact chemical composition of many substances used in testing. In order to prevent severe local or systemic reactions, it is best to test by the drop method without a dressing or to apply a dressing and keep the patient under close observation for one or more hours. Human controls may be necessary.

The effect of new chemicals to be introduced into industries should be tested on guinea pigs, not on workers, in order to determine the sensitizing capacity of the chemical rather than the sensitization index of the worker.

HISTORIES OF CASES

Careful history taking is essential in the diagnosis of dermatoses. Two separate histories should be secured. The dermatologist's assistant should take the first one, and after giving the patient an interval of reflection in which to recall additional information, the dermatologist himself should take the second history. The two histories should then be compared and discrepancies between then checked.

CONCLUSION

A word needs to be said about rehabilitation of injured employees. There is no more pathetic sight than a trained worker who has suffered a severe dermatitis as a result of his work and who cannot return to it for fear of recurrence. A way should be found to train such persons in a new trade, one which will bring them as nearly as possible their previous wage.

The two chief aims now before dermatologists are the perfecting of the protective machinery already set up in Massachusetts and other states and its duplication in states which have not yet recognized occupational dermatosis in their compensation laws. The Committee on Industrial Dermatoses, by fostering education along preventive lines, proper legislation and the rehabilitation of incapacitated workers, will be doing its part in this program. May it be so successful in its endeavors that, like the industrial hygienist, it will eventually find that its functioning is no longer necessary.

CHRONIC GRANULOMA IN INDUSTRIAL DERMATOLOGY

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The dermatologist is occasionally asked to determine the relation between an industrial injury and chronic granuloma. In most instances the connection is only coincidental. A few cases are observed in which the relation must be seriously considered.

I recently examined the records of 3,000 patients whom I have seen in the past ten years for various carriers of insurance. They were referred for an opinion in regard to the industrial responsibility for their eruptions. In this group were 26 patients with chronic granuloma, 12 with syphilis, 9 with cutaneous tuberculosis, 1 with blastomycosis, 1 with actinomycosis and 3 with leprosy. From my experience with such cases and from pertinent findings in the literature I shall attempt to formulate conditions which must be present to ascribe chronic granuloma, either in full or in part, to an industrial injury.

SYPHILIS

An increasing number of patients with syphilis are receiving compensation each year. The latent infection has presumably been activated by industrial trauma, or else the preexisting disease has prolonged an industrial injury. These cases will probably decrease in number soon. Many large corporations are requiring a rigid physical examination, including a Wassermann test of each prospective employee. The applicant with syphilis is not employed. The employee with latent syphilis and a negative Wassermann reaction and the worker who acquires syphilis during employment will continue to be a problem. It is possible that workmen with syphilis will have difficulty in obtaining employment. This should serve as an incentive for the patient to seek treatment.

Early Syphilis.—Three patients in the group had primary syphilis, but in none of them was the infection directly or indirectly the result of employment:

1. A laborer aged 26 presented a chancre on the back of his right hand. He had scratched the area on a protruding sharp rock while digging a pit. The lesion was said to have appeared on the day following the injury. The patient was first

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seen one month after the appearance of the primary lesion. His Wassermann reaction was strongly positive. Responsibility was denied because of the lapse of but one day between the injury and the development of the lesion.

2. A laborer aged 32 noticed a swelling in his right groin that he thought was a hernia caused by lifting heavy timber. Examination revealed the presence in the sulcus of a small ulcerated primary lesion of which the patient had not been aware. Dark field examination gave positive results. All liability was denied.

3. A salesman aged 26 had a chancre on the posterior surface of his thigh. He attributed the infection to contact with a toilet seat in the store. As it could not be proved that any one using the toilet had active syphilis, industrial responsibility was not accepted.

Two patients were referred for determination of whether they had primary lesions of syphilis:

1. A radio repair man had a pea-sized painless granuloma on the palmar surface of his thumb and rather marked axillary adenopathy. The lesion on the thumb appeared fourteen days after a puncture wound with an upholstery tack. Spirochetes were not seen on dark field examination. The lesion was an atypical pyogenic infection. If it had been a primary syphilitic sore, it probably would have been necessary to accept responsibility. This would have been an example of a syphilitic infection's gaining entrance to the body through an industrial wound.

2. A woman investigator aged 33 was hired to attempt to seduce a questionable malingerer with an injury of the back. She was severely beaten by the man when he discovered her ruse. She was referred to me for determination of whether her cutaneous lesions were due to syphilis. They were not, but if they had been it would have been necessary to accept full industrial responsibility for the infection.

Early syphilis is primarily a public health problem; however, Louste,[1] Gougerot[2] and others have described chancres developing at the sites of industrial injuries. When such lesions occur, the carrier of insurance must provide treatment for the patient throughout the course of his disease.

The localization of lesions of secondary syphilis is seldom influenced by trauma encountered in industry. Thornley[3] reported the findings in a case in which a lesion of syphilis on the palm followed a blister which developed as a result of manual labor. Spirochetes were recovered from it. The patient had been inadequately treated for early syphilis two years previously.

In the cases of the following patients with secondary syphilis the question of industrial responsibility arose:

1. A telegraph operator with secondary syphilis on the palms, believed to be due to trauma from the telegraph key.

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1. Louste: Bull. Soc. franç. de dermat. et syph. **32**:444, 1925.

2. Gougerot: Bull. Soc. franç. de dermat. et syph. **32**:445, 1925.

3. Thornley, J. P.: An Unusual Manifestation of Syphilis Following Trauma: Report of a Case, Arch. Dermat. & Syph. **15**:690 (June) 1927.

2. A cook with secondary syphilis on the forehead, attributed to striking his forehead against a shelf.

3. A silver polisher with secondary syphilis on the hands and forearms, ascribed to irritation from the polish.

4. A cook with condylomata lata around his anus, said to be due to irritation from perspiration in a hot kitchen.

5. An automobile mechanic with macular lesions of secondary syphilis, most prominent on the face and forearms, attributed to irritation from contact with grease and oil in his work.

6. A rice worker with palmar lesions of syphilis, termed "rice poisoning" by the patient.

7. A dishwasher with lesions of late secondary syphilis on his palms, attributed to irritation from soap and water.

Industrial responsibility was denied for the condition of each of these patients, even though trauma may have played some part in the localization of the lesions. It is my belief that the lesions of secondary syphilis should not be considered as having been materially influenced by an occupational injury. In all instances the course of the disease would have been the same if injury had not occurred. As a rule, it is not difficult to relieve industry of responsibility for early syphilis. The venereal aspect of the disease is so thoroughly entrenched in the patient's mind that in most instances he is anxious to drop his claim as soon as he realizes that he has syphilis.

Late and Latent Syphilis.—Late and latent syphilis present a different problem. It is well known that lesions of late syphilis are often precipitated by relatively minor injuries. It is often necessary to appraise industrial responsibility for such conditions. Industrial liability may be considered when (1) preexisting syphilis is activated or accelerated by an industrial injury, or (2) convalescence from an industrial injury is prolonged by preexisting syphilis.

PREEXISTING SYPHILIS ACTIVATED BY INDUSTRIAL INJURY

In 2 patients whom I observed, the question of the influence of an industrial injury on the course of preexisting syphilis arose:

1. A maid aged 50 presented ulcerative gummas around one knee. She attributed the lesions to the bite of a spider. While accompanying her employers on a vacation in the mountains, she had slept in an attic, where the rafters were covered with cobwebs. A small red spot appeared on her knee. She believed this was a spider bite, although she had not actually seen a spider. All responsibility was denied, as it was not known that the patient had been bitten. It was difficult to believe that such an injury would be sufficient to localize a gumma in a person with a preexisting syphilitic infection.

2. In a laborer aged 34, symptoms of dementia paralytica developed during convalescence after cerebral concussion sustained at work. He had become tangled in a rope and was thrown into the hold of a ship. He had never before shown

any symptoms of syphilis of the central nervous system. Dementia paralytica developed within two weeks after the injury. The case is in litigation at present. I believe that the patient will be awarded compensation, as an occupational injury apparently activated or accelerated preexisting syphilis.

Dementia Paralytica: I have observed in this series only 1 patient (just described) with dementia paralytica precipitated by trauma. Klauder,[4] Rubenstein,[5] Mott[6] and many other authors have reported similar examples. In many instances in which claim for compensation has been made, dementia paralytica undoubtedly preceded, rather than followed, the trauma, and lack of judgment due to the disease was the cause of the injury. It is generally stated that the onset of dementia paralytica may be considered as having been precipitated by an injury when one or two weeks has elapsed between the injury and the development of the symptoms of the disease.

Interstitial Keratitis: Barkan,[7] Osborne and Putnam[8] and others have reported instances of interstitial keratitis developing after industrial injury. This sequence of events occurs more frequently in patients with congenital than in those with acquired syphilis. In such cases it is necessary that compensation be paid until vision is restored. To those patients in whom scarring of the cornea causes some loss of vision, compensation for partial permanent disability must be awarded.

Cardiovascular Syphilis: Heavy and long-continued exercise definitely predisposes the patient with preexisting syphilis to aneurysm and cardiac disease. Rubenstein[5] cited the case of a man who worked continuously for sixteen hours at hard labor, and to whose widow compensation was paid for a ruptured aneurysm and the case of a man with mitral regurgitation who had worked in excessive heat for two years, in which it was decided that his employment had hastened death. Other similar cases have been reported.

Comment: It would appear that preexisting syphilis of any part of the body, especially the skin, bones and cardiovascular and central nervous systems, may become localized, activated or accelerated by an industrial injury.

Klauder[4] has reported a number of instances of gumma appearing at the site of industrial injury. His article, published in 1922, is of much interest. Many medical and medicolegal treatises written since that time have derived much of their information from it. Sawyer and

4. Klauder, J. V.: Syphilis and Trauma, J. A. M. A. **78**:1029 (April 8) 1922.

5. Rubenstein, I. H.: Indust. Med. **6**:191, 1937.

6. Mott, F. W.: Syphilis of the Nervous System, in Power, D., and Murphy, J. K.: A System of Syphilis, ed. 2, London, H. Frowde and Hodder & Stoughton, 1914, vol. 4, p. 240.

7. Barkan, H.: Tr. Am. Ophth. Soc. **24**:393, 1926.

8. Osborne, E. D., and Putnam, E. D.: Pennsylvania M. J. **39**:223, 1936.

Slater [9] stated that in the cases of 25 of a group of 176 syphilitic laborers, injury focused attention or decided the situation of the syphilitic lesions. Gougerot and Filliol reported a case [10] of gumma developing on the leg after a dog bite, and one [11] in which a similar lesion appeared after an injection of caffeine. Milian and Lotté [12] and Clément-Simon [13] described gumma developing after trauma. Gumma on the frontal bone of Mohammedans caused by striking the forehead on the marble floor of the mosque during worship [14] has been described repeatedly. Gougerot and Clara [15] reported tertiary lesions developing in the skin, muscles and bones at the site of wounds received during the World War. In the medical literature there are innumerable other reports of gumma appearing after injury.

Rubenstein [5] cited the case of Keller vs. Industrial Commission, in which it was stated:

> Compensation may be awarded for an injury although there is a preexisting syphilis, if this disease is aggravated and accelerated by such injury, but an award cannot be sustained where the evidence shows that the disability would have arisen regardless of the injury.

When preexisting syphilis is influenced by injury, the employer may be required to render treatment necessary to heal the local lesion but is not liable for further treatment. An employee with untreated syphilis is a potential candidate for industrial liability. An employer will safeguard his interests by insisting that workers pass a physical examination, including a Wassermann test, before employment and at regular intervals thereafter.

INDUSTRIAL INJURY PROLONGED BY PREEXISTING SYPHILIS

Preexisting syphilis does not frequently retard or prolong recovery from an industrial injury. Menninger [16] stated that in 72 per cent of a group of patients with syphilis there was difficulty in the healing of wounds. Stokes [17] has stated that from 7 to 10 per cent of untreated patients have postoperative difficulties due to their syphilis. The latter estimate is undoubtedly more nearly correct. In surgical procedures the principal danger of syphilis is that it leads to errors in diagnosis.

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9. Sawyer, W. A., and Slater, B. J.: J. Indust. Hyg. **8**:317, 1926.
10. Gougerot and Filliol: Bull. Soc. franç. de dermat. et syph. **33**:688, 1926.
11. Gougerot and Filliol: Bull. Soc. franç. de dermat. et syph. **33**:689, 1926.
12. Milian and Lotté: Bull. Soc. franç. de dermat. et syph. **33**:175, 1926.
13. Clément-Simon: Bull. Soc. franç. de dermat. et syph. **33**:549, 1926.
14. Lacapère, G., and Laurent, C.: Paris méd. **8**:94, 1918.
15. Gougerot, H., and Clara: J. méd. franç. **7**:216, 1918.
16. Menninger, W. C.: Am. J. Syph. **9**:545, 1925.
17. Stokes, I. H.: Modern Clinical Syphilology, Philadelphia, W. B. Saunders Company, 1926, p. 383.

Stokes [18] advised:

> Whenever an unfavorable reaction to injury is out of all proportion to the gravity of the injury or the seriousness of the exciting cause, suspect syphilis, especially if the onset of reaction symptoms is delayed.

When convalescence from an industrial injury is retarded by preexisting syphilis, antisyphilitic treatment is required only to the extent necessary to heal the industrial injury. In such cases, as Foerster [18a] has stated, "compensation is not dependent on any implied assumption of perfect health."

TUBERCULOSIS

In most of the cases reported, the types of tuberculosis of the skin due to industrial injury have been tuberculosis verrucosa cutis (Riehl) and the primary complex (tuberculous chancre) of cutaneous tuberculosis.

Tuberculosis Verrucosa Cutis.—Tuberculosis verrucosa cutis is usually due to inoculation of the tubercle bacillus from without the body. Patients with these warty lesions generally have had a previous tuberculous infection which has altered their reaction to subsequent inoculation. The infection is superimposed and is purely local. Lesions of this type occur most frequently on the backs of the hands. A patient with pulmonary tuberculosis may wipe his mouth with the hand and thus inoculate the tubercle bacillus into broken or traumatized skin.

The disease may be caused by the bovine as well as the human type of organism. Sequeira [19] reported a case in which the infection developed in a burn from an electric light while the patient was working in a butcher shop. Wichmann [20] described 27 cases of tuberculosis verrucosa in butchers of Hamburg, Germany. Joseph and Trautmann [21] observed 7 cases in slaughterers. Many similar instances have been reported.

In this series there were 3 patients with this type of tuberculosis:

1. A Filipino waiter aged 24 presented a warty lesion on the back of his right index finger. While washing glasses, he had cut the finger on a broken glass. About two weeks later the lacerated area began to thicken. The patient had reported to the nurse in charge of employees when the finger was cut. She saw him on several occasions thereafter. The lesion proved to be inoculation tuberculosis. In view of the definite history of trauma preceding the appearance of the lesion, it was accepted as being of industrial origin. It was assumed that tubercle bacilli had gained entrance to the skin through the industrial wound.

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18. Stokes,[17] p. 712.

18a. Foerster, H. R.: Industrial Dermatoses, Arch. Dermat. & Syph. **17**:13 (May) 1928.

19. Sequeira, J. H.: Brit. J. Dermat. **25**:99, 1913.

20. Wichmann, P.: Dermat. Wchnschr. **79**:773, 1924.

21. Joseph, M., and Trautmann, G.: Deutsche med. Wchnschr. **28**:200, 1902.

2. An American man aged 62 had an area of tuberculosis verrucosa cutis the size of a silver dollar on the back of his right hand. This lesion had been present four months. The patient was employed as a janitor. He stated that he had scratched the area on a piece of galvanized iron while at work. Instead of healing, the scratched area became thickened and verrucous. Physical examination revealed that the man had active pulmonary tuberculosis. It was assumed that he had implanted tubercle bacilli in the wound by wiping his mouth with the back of his right hand. As the patient was unable to work as a janitor because of the lesion on the hand, compensation was paid for seven months. By this time the pulmonary disease had progressed, and his general condition made him unable to work. Further liability was then denied, as the lesion on the hand was no longer causing the disability. The progress of the pulmonary involvement was independent of the manual labor.

3. A Mexican man aged 35 had about 18 localized warty areas of tuberculosis verrucosa cutis of three years' duration on the backs of his hands and forearms. He was employed as a butcher of cattle condemned because of tuberculous infection. From the history it was judged that he probably had had a pulmonary lesion at about the time the cutaneous lesions appeared. The pulmonary infection was quiescent at the time of examination. It was decided that the infection was probably due to the bovine type of organism. The extent of the lesions and the rapid improvement under roentgen therapy seemed to justify this assumption. Full responsibility was accepted, and the patient was given medical care and compensation until his cutaneous lesions were healed.

The lesions of tuberculosis verrucosa cutis in all 3 of these patients were accepted as having been caused or aggravated by employment. Complete medical care was given and full compensation paid as long as the patients were unable to work because of the local lesions.

The Primary Complex of Cutaneous Tuberculosis.—The primary complex of cutaneous tuberculosis (tuberculous chancre) is seen in those who have not previously had tuberculosis. The lesion is a papule or ulcer at the site of inoculation. This is followed by regional adenopathy, with possible subsequent suppuration and sinus formation. Tubercle bacilli may be present in the primary lesion and the regional lymph nodes.

One patient with this type of involvement was observed:

A nurse aged 22, working in a ward for patients with tuberculosis, punctured the end of her thumb with a safety pin. A papule appeared at the site of the puncture wound. It subsequently ulcerated, and lymphangitis with marked axillary adenopathy developed. The axillary nodes broke down and were slow in healing. Tubercle bacilli were isolated from the ulcer on the thumb but not from the axillary sinus. While this case was probably an example of the primary complex of cutaneous tuberculosis, there was a possibility that the lymphangitis might have resulted from a secondary infection with pyogenic organisms. Industrial liability was accepted, and compensation was paid throughout the course of the disease.

This type of infection will probably be observed in the practice of industrial medicine more frequently in the next few decades. There is a decreasing incidence of infection with tuberculosis in children of

school age. The National Tuberculosis Association [22] reported that 44 per cent of a group of children between the ages of 3 and 7 years examined in 1917 reacted to tuberculin. In 1926 only 20 per cent of a group of children of the same age group and in the same community gave positive reactions. Indications are that a similar group examined at the present time would show an even lower percentage of positive reactions. This is undoubtedly due in large part to control of adults with active lesions and to regulation of the milk supply. When these children reach adult life and local infections of the skin with tubercle bacilli develop, the resulting lesion will probably be the primary complex of cutaneous tuberculosis and not tuberculosis verrucosa cutis.

Tuberculid.—Tuberculid is presumably caused by tubercle bacilli carried to the skin by the blood stream and there destroyed by immune bodies. Trauma may play some part in the localization of these lesions, but it is believed that the course of the disease will not in most instances be materially altered by industrial injury.

There were 5 patients in this series with tuberculid on their hands, forearms or legs. In each instance the disease was attributed to irritation resulting from employment. However, when the diagnosis was established by clinical or microscopic evidence or both, it was immediately decided that the eruption had not been caused or appreciably aggravated by the patient's employment.

1. A photographer aged 34 presented lesions of papulonecrotic tuberculid on his hands, forearms and knees. He attributed the eruption to irritation from chemicals used in his work.

2. A laborer aged 23, employed by an oil company, had lesions of papulonecrotic tuberculid on his knees and the lower parts of his legs. These, he believed, were caused by irritation from oil.

3. A laborer aged 22, who worked in a chemical plant, had pea-sized areas of granuloma annulare on the backs of his hands of two years' duration. The lesions were more severe in winter. He believed that they were due to irritation from nitric acid used in his work.

4. A woman aged 36 had lesions of erythema induratum on the lower parts of her legs. She attributed the first lesion to a fall in which she had struck her leg against the steps. Subsequent lesions appeared spontaneously.

5. A man aged 23 had lesions of erythema induratum on the lower parts of his legs. The initial lesion was attributed to an industrial injury.

I have not found a record of any case of tuberculid in which employment was considered to be a causal or contributory factor.

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22. Whitney, J. S.: Facts and Figures About Tuberculosis, New York, National Tuberculosis Association, 1931, p. 38.

LEPROSY

Occasionally a case of leprosy is observed in a group of patients with industrial dermatoses. Three patients with this disease were seen in this group of 3,000:

1. A Mexican woman aged 30 had lesions of nodular leprosy on her face, hands and legs of two months' duration. She attributed the eruption to irritation from contact with burlap in her work in a bag factory. She had been in the United States for one year. Industrial responsibility was denied when the diagnosis was established.

2. A Mexican man aged 24 presented lesions of neural leprosy on the left hand, left foot and buttocks of four months' duration. The patient stated that the lesion on the hand developed shortly after an injury. If lesions elsewhere on the body had not been present, it might not have been possible to differentiate the lesion on the hand from the changes in skin and tissue following a neural injury. It is difficult to believe that an injury could localize a lesion in a leprous person. It could have been asserted that the site of injury of the peripheral nerve in this patient had been subsequently invaded by lepra bacilli from preexisting leprosy. It was decided that the disease was not of industrial origin.

3. An American man aged 42 had areas of neural leprosy on his legs and thighs. The lesions finally extended over the entire body and face. The patient was a coffee buyer for an importing company in South America. The lesions of leprosy developed about five years after his return to the United States as an official of the same importing company. It was decided that the disease had been acquired during the patient's residence in South America. Most large corporations accept the responsibility for any infection except venereal disease that has been acquired by their employees while on foreign service.

The industrial status of leprosy is difficult to establish because of its long period of incubation and because the source of infection and mode of transmission of this disease are not known. Fordyce[23] discussed in some detail a patient of Marcus Haase with nodular leprosy. The man worked with matting which he received in original packages from China. Inquiry was made to determine if lepers were engaged in the weaving of matting in China. If lepra bacilli may live for two years when exposed to the air, the possibility of such a source of infection must be considered.

DEEP MYCOSES

Actinomycosis, Blastomycosis and Infection by Coccidioides.—In the group reviewed there were 1 patient with actinomycosis and 1 with blastomycosis, but none with infection by Coccidioides.

1. A man aged 36, employed as a dairy inspector, had rather severe actinomycosis of the right side of his neck and jaw, which became apparent after the removal of an infected lower back tooth.

Actinomycosis in man is seldom acquired from cattle. In man and animals the disease undoubtedly comes from the same source, namely, the soil, grasses

23. Fordyce, J. A.: M. Rec. **81**:207, 1912.

and grain. In many human beings it appears after the removal of a carious tooth. The question as to whether the infection was present before the tooth was removed or developed subsequently in the tooth socket always arises. This patient undoubtedly would not have acquired the disease if he had not been working as a dairy inspector. The disease was therefore accepted as being due to his employment.

2. An automobile mechanic aged 42 had an extensive warty lesion of blastomycosis covering the back of the left hand. It was accepted as being of industrial origin, because it had appeared during the healing of an abrasion that had occurred during his routine work.

In California blastomycosis is an uncommon disease. Coccidioidal granuloma is observed frequently, but I have never seen a patient with this disease regarding whom there was a question of industrial responsibility. All the patients with coccidioidal granuloma whom I have observed were self employed or employed by a railroad, and it was not my function to determine their industrial status. The relation of infection with Coccidioides immitis to employment is of sufficient importance to justify consideration.

Coccidioidal Granuloma: The source and mode of infection of coccidioidal granuloma is not definitely known, and the period of incubation is variable. For these reasons it is difficult to determine in a given case when the disease was acquired. The causative organism grows on vegetable matter and even on damp decaying wood. The spores are found in the soil and during the dry season are blown about and inhaled by exposed persons. Most infections probably occur by way of the respiratory tract. Local lesions of the skin may occur occasionally. The disease is often fulminating and may cause death in a few weeks. In some instances it is markedly chronic, and in 1 patient under my observation it remained as a relatively benign infection for over twenty years. Any one in an endemic area during the dry season runs the risk of infection by inhaling dust-laden spores of C. immitis.

Respiratory Involvement: Miller [24] reported the cases of 2 patients employed on the same construction project for less than three months who died of a fulminating pulmonary type of infection by C. immitis within three weeks of the onset of symptoms. The Industrial Accident Commission of the state of California established a precedent and ruled that the disease was not of industrial origin in these cases. The opinion was based on the proof of chronicity of the disease and the "risk of commonalty," which implies that any one living in the endemic area is subject to the same risk.

Cutaneous Lesions: A few patients with local cutaneous lesions of coccidioidal granuloma have been given compensation in this state with-

24. Miller, F. P.: Pulmonary Manifestations of Coccidioidal Granuloma, Dis. of Chest **3**:21-24, 1937.

out having been brought before the commission. One man struck his thumb with a hammer, and it was assumed that an infection with Coccidioides developed in the contused area. I observed a merchant seaman who had been thrown forward on his knees during a storm at sea. The knee became painful and swollen, and the leg was ultimately amputated when the diagnosis of coccidioidal granuloma was established. The man had lived in the endemic San Joaquin Valley for six months, eleven years prior to the accident. If this case had come before the commission it would seem that an award should have been made in favor of the patient. A preexisting quiescent coccidioidal infection was probably activated and localized by an industrial injury. The so-called "blanket legislation" covering industrial injuries in California provides compensation for any disabling disease arising from employment. This adequately covers local lesions of coccidioidal granuloma developing at the site of an injury or of a preexisting infection activated or localized by an industrial injury.

I know of only 4 patients with cutaneous lesions of coccidioidal granuloma who have been brought before the Industrial Accident Commission in this state. Liability was denied in all cases when it was established that the patients also had active pulmonary involvement. Most patients with lesions of coccidioidal granuloma that are assumed to be local have or ultimately will have signs of dissemination or of pulmonary involvement. If a local lesion of coccidioidal granuloma is accepted as being the result of employment and pulmonary involvement subsequently develops, it must be assumed that the infection of the respiratory tract was secondary to the cutaneous lesion. Actually, it may have preceded it but did not become manifest until later.

SUMMARY

Patients with cutaneous lesions of syphilis, tuberculosis, leprosy and the deep mycoses are observed occasionally in the practice of industrial dermatology.

Early syphilis is seldom an occupational hazard. Late and latent syphilis may be activated or accelerated by trauma; convalescence from an industrial injury may be prolonged by preexisting syphilis. This subject has been discussed in the medical literature many times previously. The problem is reviewed, and a few cases are reported.

The incidence of infection with tuberculosis in childhood is decreasing. More people will soon be reaching adult life free from tuberculosis. If these persons acquire a local cutaneous infection with tuberculosis, it will in many instances be of the primary complex type and not tuberculosis verrucosa cutis, which is usually observed at present.

The industrial status of leprosy is difficult to determine, owing to its long period of incubation and questionable source and atrium of infection. Employees engaged in foreign trade in countries where leprosy is endemic present a special problem if they acquire the disease.

Coccidioidal granuloma is of considerable importance industrially in California. Persons in whom cutaneous lesions of this disease develop at the site of an injury have been given compensation in a few instances. When it has been established that the employee has involvement of the respiratory tract also, all liability has been denied. Patients with the respiratory type of infection of coccidioidal granuloma have not been awarded compensation. It has been decided that the risk of inhaling dust laden with the spores of C. immitis is common to all inhabitants of an endemic area.

WAR GASES AND INDUSTRIAL HAZARDS IN THEIR MANUFACTURE

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At 5 a. m. on April 22, 1915, the Germans released about 180 tons of chlorine gas from 5,730 cylinders on a front of 6 kilometers. Results were disastrous to the English and French colonials. About 5,000 men were killed and many more were incapacitated. Fifty guns were lost, and the Allies were forced to abandon their position. This first surprise gas attack on an unprepared foe showed the possibilities of this mode of offense either in actual warfare or in civil strife.[1]

In connection with industrial medicine, opportunity has been afforded in a plant in northern Ohio for a study of a few of these products. As the manufacture of chemical agents used in war at one time or another has resulted in a series of untoward dermatologic episodes, we were called in in the hope, first, that they might in part be prevented and, second, that they might be cured as expeditiously as possible.

The chemical agents used in combat are of three types, gas, smoke and incendiary preparations.[2]

Since this paper will be devoted to a few of the gases only, we shall simply mention smoke agents used to conceal movements, or to screen, and incendiary preparations designed to promote fires. The latter go back in history as far as the use of "Greek fire."

TYPE OF GASES

Gases are used with the idea of incapacitating opposing groups in police work, in labor strife and in warfare. The type to be employed depends a great deal on the object desired.

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Read at the Sixty-First Annual Meeting of the American Dermatological Association, Inc., Del Monte, Calif., June 11, 1938.

1. Vedder, E. B.: Medical Aspects of Chemical Warfare, Baltimore, Williams & Wilkins Company, 1925.

2. Norris, G. W.: Gases in Warfare, J. A. M. A. **71**:1822 (Nov. 30) 1918.

If it is simply a temporary incapacity, as in police work, a lacrimator may be chosen for its irritating effect on the eyes.

Under certain conditions irritant gases, often called sternutators (sneeze gases), may be employed. These agents are designed to affect the upper air passages, producing sneezing, severe headache and emesis. They are not used so much in police work and in labor difficulties as in warfare.

Vesicants are war gases employed to produce vesicular and bullous lesions of the skin and mucous membranes.

"Systemic toxic" gases, to use Prentiss and Fisher's [3] definition, are agents which in their systemic action exert a direct paralyzing effect on the heart and nervous system. They are usually the most deadly of the gases.

Nomenclature of Chemical Agents

Chemical Name	Chemical Formula	English Name	American OWS* Symbol	French Name	German Name
Bromacetone	CH_3COCH_2Br	BA	BA	Martonite	B-Stoff
Carbonyl chloride	$COCl_2$	Phosgene	CG	Collongite	D-Stoff
Chloroacetophenone	$C_6H_5COCH_2Cl$	Tear gas	CN	.....	.....
Chloropicrin	OCl_3NO_2	Vomiting gas	PS	Aquinite	Klop
Chlorovinyldichloroarsine	$CHClCHAsCl_2$	Lewisite	M-1	.....	.....
Dichloroethylsulfide	$(ClCH_2CH_2)_2S$	Mustard gas	HS	Yperite	Lost; also Yellow Cross X
Diphenylaminechloroarsine	$(C_6H_5)_2NHAsCl$	Adamsite	DM	.....	.....
Diphenylchloroarsine	$(C_6H_5)_2AsCl$	.....	DA	.....	Clark I
Diphenylcyanarsine	$(C_6H_5)_2AsCN$	.....	CDA	.....	Clark II
Ethyldichloroarsine	$C_2H_5AsCl_2$	.....	ED	.....	Dick; Green Cross-3
Phenyldichloroarsine	$C_6H_5AsCl_2$	.....	....	Sternite	Blue Cross-1

* Chemical warfare service.

Pulmonary irritants are employed for their action on the respiratory passages, e. g., chloropicrin (PS, or vomiting gas), known to the Germans as *Klop*.

While these are the main divisions into which gases may be separated, it is impossible to divide them too exactly, as a gas may have characteristics of several divisions.

Since most gases are intricate compounds with long chemical formulas, it has been found more convenient to designate them in some instances by common names or symbols. A few of the better known ones are indicated in the table.

The effects of a gas depend on several factors: (*a*) its toxicity, (*b*) its irritating effects, (*c*) its concentration, (*d*) the time of exposure, (*e*) its persistence and (*f*) the effects of the weather.

3. We shall frequently refer to A. M. Prentiss and G. J. B. Fisher's Chemicals in War (New York, McGraw-Hill Book Company, 1937).

It is not our intention in this paper to be too technical. Any physician who works in a chemical laboratory knows the toxic and irritating effects of chlorine; yet its lethal index is far less than that of mustard gas, lewisite or phosgene.

The irritating effects are likewise most important. In chemical warfare "a tolerable limit," i. e., the time an unprotected man can endure a maximum concentration without physical disability, is spoken of. It is short: one minute.

Naturally much of the effect of a gas will depend on its concentration. Hydrocyanic acid gas is known to be very toxic. Yet it was not found to be of much value for the purposes of war, because of its rapid diffusion. It is lighter than air. It was impossible to make a lethal concentration.

The time of exposure to a gas would of course have a bearing on the effects of the agent. If a man were exposed for from one to several hours, he would react much more than after a short exposure.

This item is definitely linked up with the persistence of a gas, or its concentration in effective amounts. The American army classifies gases in two groups, persistent and nonpersistent. If the action persists less than ten minutes, a gas is classified as nonpersistent, i. e., its effect is lost by volatilization or dispersion. Persistent gases having a high boiling point may last from ten minutes to several hours, and a gas may be so persistent that it will interfere with the attacking troops that sent it over. Naturally this must be obviated, or the troops producing it will suffer.

The effects of the weather have great importance in the use of gases. It is said that during the last year of the World War the Allies had an advantage in the use of these agents, since the wind blew a larger part of the time from south to north. Other factors enter into gas warfare, such as prominences of the earth's surface, hills and valleys, high trees, production of constant convection currents on a clear summer day and descending air currents on a clear night, with high barometer readings. Most of the gases are heavier than air and tend to settle into depressions on the earth, into dugouts, trenches and so forth. Vedder [1] stated that light rainfall has little effect on most gases and that even heavy rain has little influence on mustard gas. Phosgene and lewisite, however, would not be so effective in heavy rain, as they are hydrolyzed. Foggy weather would be excellent for gas attacks if the gases were not destroyed by the moisture.

In the particular plant where we were called in as consultants, a number of gases have been experimented with, but most interest and activity were centered on diphenylchloroarsine (DA), chloroacetophenone (CN) and diphenylaminechloroarsine (DM). In only a few

instances were the effects of mustard gas (HS, or dichloroethylsulfide) and of phenyldichloroarsine (sternite) noted.

RÉSUMÉ OF THE FIVE COMPOUNDS

Chloroacetophenone.—CN is the preparation generally known to the public as tear gas. Under normal conditions it is a solid, only slightly soluble in water but soluble in ether, alcohol or benzene. It is destroyed by a hot aqueous solution of sodium carbonate. It is formed by the chlorination of acetic acid to produce monochloroacetic acid, followed by chlorination of this product with chlorine and sulfur monochloride to produce chloroacetyl chloride. Then the treatment of this compound with benzene, with anhydrous aluminum chloride as a catalyst, results in chloroacetophenone ($C_6H_5COCH_2Cl$), which is not affected by moisture, is not changed in contact with steel shells and may be used in rifle grenades, hand grenades and candles.

The action is that of a lacrimator and irritant of the upper respiratory passages. Its effect is almost instantaneous and lasts for several hours. When applied to the human skin it causes burning and even small vesicles if concentrated. If high concentrations reach the eyes, conjunctivitis lasting for twenty-four hours or more may ensue.

Treatment consists in washing the eyes with solution of boric acid or sodium bicarbonate. The severe effects, of course, are only transient.

The advantage of this preparation consists in the small amounts required to produce severe local irritation and the forcing of soldiers to mask. On that account it has been put in shells along with a more toxic pulmonary irritant and lacrimating gas, chloropicrin dissolved in chloroform.

Diphenylchloroarsine.—DA is a derivative of arsine (AsH_3). Two of the hydrogen groups are replaced by phenyl groups and the third hydrogen group by chlorine. It was intended during the war to be used as an accompanying gas to mustard, the effect of which would not be so persistent. The Germans used a complex method of manufacture.

When DA is volatilized by heating, it is dispersed in fine particles, intended by the Germans to be so small that they would pass through the gas masks. Unfortunately, when dispersed by explosion of shells, the particulate masses were so large that they did not pass through the masks.

The allied chemists, according to Norris'[4] interesting report on methods of manufacture, in attempting the manufacture of the product,

4. Norris, J. F.: Contributions from the Chemical Warfare Service of the United States Army, J. Indust. & Engin. Chem. **11**:817, 1919.

found that a similar compound, diphenylaminechloroarsine, could be readily and cheaply manufactured. Moreover, it seemed to be equally effective. It differs from the former preparation only in the addition of an amino group and is produced by the heating together of diphenylamine and arsenic trichloride. DM resists steel and iron. DA does not. Moreover, DM is more toxic.

Both compounds are irritating to the mucous membranes of the eyes, nose and throat. There is irritation of the chest with sensations of suffocation, accompanied with ropy saliva, headache and nausea. With excessive exposure there are numbness in the limbs and even sharp pains. The effects last from one to three hours and persist longer with DM. With both these gases the victim fails to realize the severe after-effects until too late. In cases of severe effects there may be giddiness (Vedder [1]), loss of motor power and loss of consciousness. Nervous disturbances seen afterward have been ascribed to general absorption of the poison, though not considered evidence of arsenical peripheral neuritis. In a few cases, however, symptoms of actual arsenical poisoning have been observed.

Such stable arsenical compounds have been known to contaminate water, and Vedder [1] reported that in a company obtaining water for shaving and washing from a shell hole burning of the eyes and gums, swelling of the cheeks and soreness of the throat developed. Several men who drank the water began to vomit. The water was found to contain 3.75 mg. of arsenic trioxide per liter. A flanking company using only water from their water cart had no difficulty.

Treatment: This consists of fresh air and removal of any contaminated clothing, since small amounts of the latter may cause further symptoms. As a rule, there will be complete recovery in a few days. Chlorine unites with DA to form a nontoxic product, so that a preparation like chloramine cream is indicated in case of burns, or as a prophylactic application for chemists or workmen handling the compounds. Moreover, a 1 to 4 per cent aqueous solution of chloramine T may be employed locally in case of strong concentrations on the skin. For vesicular and bullous lesions seen in workmen, we found the use of chloramine cream helpful. Best results, however, were achieved through removing the tops of the bullae with sterile scissors and forceps and the use of warm baths of potassium permanganate 1 : 5,000. The individual denuded areas were painted with a 5 per cent solution of methylrosaniline in 20 per cent alcohol. Finally 25 per cent glycerite of tannic acid in hamamelis water was found to be helpful in cases of a mere dermatitis. The lotion was simply sopped on and was soothing and astringent in its effects.

Phenyldichloroarsine.—Sternite [5] was the first toxic agent of the pulmonary irritant type—causing injury to the lungs and death by pulmonary edema. It also acts as a vesicant and as a sternutator. It is more toxic than phosgene. It was generally used in the last war as a solvent for DA, and according to Prentiss and Fisher it may be employed more in the next war.

Mustard Gas.—This was called *yperite* by the French, since the Germans first used it against the British at Ypres, and "yellow cross," since the Germans used it in shells with a yellow cross. It is a heavy yellow liquid. In weak concentration it has an odor resembling mustard.

It is insoluble in water but is eventually rendered harmless by hydrolysis. It is easily dissolved in gasoline, kerosene, alcohol or acetone; hence, these preparations may be used to remove it from clothing. In the liquid state it readily goes through rubber or leather.

Mustard gas caused more casualties in the last war than any other gas. It acts first as a cellular irritant and second as a toxic agent killing the cell. Symptoms usually do not appear for some hours—four or five, and up to even twenty-four. They consist of local inflammation of the eye, various forms of erythema, vesiculation and ulceration of the skin, inflammation and even necrosis of the mucous membrane of the throat and respiratory tract. If the victim has swallowed any gas there will be a similar group of symptoms related to the esophagus, stomach and intestines. The general symptoms are those of profound depression, nausea, vomiting, headache and exhaustion. Acute bronchopneumonia may occur as a complication, even causing death.

There seems to be a great deal of difference in the sensitivity to mustard. As Vedder said, some persons show distinct burns (erythema) from a fifty second exposure, while walking beside them are men who require an exposure of five or ten minutes to produce a burn. Needless to say, the former persons should not be employed in a plant manufacturing mustard gas.

PERSONNEL AFFECTED

This study is limited to 24 persons ranging in capacity from chemists and millwrights to washers of glassware.

Two patients were affected by diphenylchloroarsine (sternite) and 1 by diphenylaminechloroarsine (DM). Two were affected by tetraphenyl tin and triphenyl tin (OH), by dichloroethylsulfide (HS), 1 by chloroacetophenone (CN) and by far the greatest number by diphenylchloro-

5. Flury, F.: Ueber Kampfgasvergiftungen: IX. Lokal reizende Arsenverbindung, Ztschr. f. d. ges. exper. Med. **13**:522, 1921. Zimmer, A.: Wien. med. Wchnschr. **85**:256, 1935.

arsine (DA). Perhaps this preponderance was due to the greater amount of this compound manufactured.

A few typical histories may be of interest and at the same time illustrate some of the contingencies that may arise even in a modern, spotlessly clean plant where every attempt has been made to prevent difficulties. In this plant certain of the operations are carried on outdoors; and suction ventilating systems are used freely when indicated. The various chemical combinations are, wherever possible, effected in closed connected retorts, and every precaution is taken to keep the men from becoming contaminated.

That carelessness played a role there was no doubt; e. g., washers of glassware ordered to wear gloves would be found using their bare hands. This may explain certain of the recurrences. Thus, among the 24 workers there were 8 with no recurrences, 11 with one recurrence, 4 with two and 1 with three or more.

Some of the difficulties came from exposure of the skin due to gloves' getting free from wristlets or jumpers' pulling out of socks. Again, a worker would remove his glove to wipe his face, or he would be caught with his sleeves rolled up.

REPORT OF CASES

CASE 1.—G. N. C., a chemical engineer, was first seen on July 28, 1937, with erythematovesicular edema of the arms, forearms, thighs and face. He had been opening up some blocked lines used in the manufacture of DA. He was given sodium thiosulfate solution locally, and the large vesicles on his thighs were opened and painted with methylrosaniline. The response was good. Again, on Aug. 6, 1937, some of the material was spilled on the floor, and vapor struck his ankles, causing erythema. There was another attack four days later. On Aug. 20, 1937, the patient was helping to reassemble some of the machinery. A tiny spray of DA got on his left wrist, where there was a bullous dermatitis. Some also showed on the ankles. It was explained to the patient that it was necessary to keep his cuffs inside his gloves if he wished to prevent the difficulty. Three days later the vesicular lesions had become crusted. The patient was advised to wear jumpers and to be careful about his cuffs. Two days later the process was nearly well.

CASE 2.—J. E. S. on June 26, 1937, while repairing a "column" containing liquid DA, was splashed by some of the liquid, and gas fumes escaped into the room and over his arms and face. His face was swollen and reddened, and his eyes were nearly shut. There was some conjunctivitis. Almost confluent bullae were present on the forearms, requiring hospitalization. Later he had another erythematous recurrence on the arms and neck, though he was not aware of exposure.

CASE 3.—T. P. G. on June 26, 1937, four hours after working with crystals of DA and DM, noticed an eruption. He had been shoveling the crystals into a crystallizing pan, after which the finished product was packed into barrels. Over the neck, axillas, forearms, hands, abdomen and scrotum there was a patchy, extremely erythematous papular dermatitis, with here and there some areas of

vesiculation and crusting. The patient was hospitalized, and baths in dichloramine were employed with good results.

On July 13, 1937, this patient had a large bullous lesion of the right arm. He stated that a pipe had been clogged up and had to be cleaned out. A great deal of DA or DM ran out, and he was hit. He took a bath immediately afterward, and used chloramine ointment. The bullous tops were taken off the areas, which were painted with methylrosaniline, and potassium permanganate was employed. Most of the lesions healed within ten days. There was one area, however, on the left arm, which was rather deep, and an ulceration formed, which lasted for about a month.

Case 4.—C. W. B., a millwright, had a palm-sized blister on the left arm and hand. He took a bottom off a tower and came in contact with some DA. He tried to use aluminum acetate for one or two days afterward. The areas were opened with care, the tops removed, the bases painted with methylrosaniline and potassium permanganate soaks employed. It took nearly a month for the areas to heal. About a week later a recurrence consisting of a bullous lesion on the right elbow followed an unknown exposure. This healed in a week.

Case 5.—M. C. L. had an erythematovesicular eruption on the forearms and the sides of the neck. He had been shoveling batches of DA all week without any difficulty. He always wore a gas mask and suit. The day before he had been steaming out a clogged line, wearing cotton gloves and rubber gloves over them and heavy jumpers down to his sleeves and ankles, with a loose overall effect on his legs. Symptoms developed within thirty minutes. A 10 per cent solution of sodium thiosulfate in hamamelis water was employed locally; he responded almost immediately and was well within a week. Later there was a recurrence. After distilling off some DA and blowing off the residue in the basement, he stood about 30 feet (914 cm.) from the pipe, wearing a canvas jacket and a gas mask; yet symptoms developed. The process cleared readily with a few days' treatment with thiosulfate.

In several cases, particularly in the laboratory, a drop of DA would splash on the ear or a large drop of mustard would land on the leather shoe. Since leather, rubber or clothing is not resistant to mustard, a large bullous lesion of the great toe would develop and take several months to heal.

That idiosyncrasy played a role there is no question. Prentiss and Fisher quoted Gen. H. L. Gilchrist in the statement that white persons are more susceptible to mustard gas than Negroes; and there is an individual susceptibility, not only of the skin but of the respiratory tract. In this particular, of 2 young chemists who worked in the same laboratory under the same conditions and on the same products, 1, as far as we know, was never incapacitated, while the other, after two or three episodes caused by DA and DM, finally became so sensitized that urticaria developed if he even entered the front door of the plant. This part of the plant, by the way, was completely separated from the manufacturing and laboratory division. His history is rather interesting:

CASE 6.—F. C. H. was employed in the chemical laboratory, working with DA, DM and phenyldichloroarsine. Two weeks previously he had noticed an eruption on his hands. The flexor surface of the right forearm showed patchy, follicular, papulopustular and erythematous lesions. Later extensive vesicles developed, and he was hospitalized. The patient returned to work one month later, and a vesicular dermatitis developed on the face after three hours' work in the laboratory. Later he returned to the plant and was exposed to diphenylchloroarsine in walking through the building. His eyes became swollen, his face was reddened, and a papular eruption appeared on his face and the backs of his hands. It was necessary once more to place the patient in the hospital. He complained also of nausea, diarrhea and cramps in the abdomen.

Examinations by Dr. R. F. Hanzal, of the department of pathology, Western Reserve University, showed 0.03 mg. of arsenic per hundred cubic centimeters of urine and 0.085 mg. of arsenic per hundred grams of feces. Professor V. C. Myers, of the department of biochemistry of the University, referred us to a table of Schwarz and Deckert,[6] which showed that the arsenic content of normal urine, as determined by different authors, is from 0.01 to 0.05 mg. per liter.

In normal feces these authors found small amounts of arsenic between 0.001 and 0.08 mg. per hundred grams fresh weight.

It was felt that in this case his cramps and diarrhea might have had some relation to the arsenic. However, Professor Myers did not agree. The patient finally became so sensitive that if he even went to the office of the plant, not going out into the plant itself or into the laboratory, an urticarial eruption developed, and he had to discontinue working there.

Thus far, no work has been done on the mechanism of the production of lesions, as we have not succeeded in convincing the heads of the firm of the value of such study; then, too, this production has temporarily been cut down. In many instances of involvement by DA the fluid from the vesicles has been rubbed on other parts of the body without production of new lesions. Thus it is evident that new lesions are produced only by new contacts with the offending agent.

TREATMENT

In the small number of persons on whom opportunity to study the effects of the gases was given, 6 required hospitalization; the remainder were simply followed in office practice.

Generally, in cases of large bullous lesions it was found good practice to remove the top with sterile scissors and forceps and paint the base with a 5 per cent solution of methylrosaniline in 20 per cent alcohol. The patient was then given baths with potassium permanganate, 1:3,000 or 1:4,000 several times a day and advised to use between the baths a 25 per cent solution of glycerite of tannic acid in hamamelis water. This astringent, emollient and mildly antiseptic treatment prevented infection, kept the parts dry and promoted rapid healing. Where cases of early involvement were encountered after contact with DA,

6. Schwarz, L., and Deckert, W.: Arch. f. Hyg. **106**:346, 1931.

chloramine ointment was used several times with excellent effect, on the theory that chlorine unites with DA to form a nontoxic product. In fact, we tried the prophylactic application of this preparation to the skin of the workers but lacked sufficient material to note the results. In cases in which there had been much irritation of the nose and throat we also tried Vedder's suggestion of inhalation of the following mixture: 40 per cent alcohol, 40 per cent chloroform, 20 per cent ether and from 5 to 10 drops of ammonia.

Prophylaxis is better than treatment for accidents incident to the manufacture of combat gas. The plant should be well equipped with ventilators; it should be kept spotlessly clean; the air should be changed constantly, and all chemical reactions should be effected in sealed containers. Products of these reactions should then be transferred as far as possible to further containers through sealed pipes without any exposure to air. This process should be kept up until the final product is evolved. Naturally, a well trained chemical corps will have fewer accidents, depending on the amount of their experience. The following routine precautions were instituted in the plant studied, with good results:

1. Absolute cleanliness in the plant.

2. Change of work clothes every two days.

3. Careful washing of the hands and face before the noon meal. It should be eaten in a room separated entirely from the work room.

4. Bath and change to street clothes every night.

5. Use of gas masks in all operations with gases dangerous to the respiratory tract.

6. With all the products except mustard gas, the wearing of rubber gloves and a mustard suit (a cotton suit impregnated with linseed oil).

7. Immediate treatment of areas affected or suspected of being affected by DA or DM with fresh solution of sodium hypochlorite (0.5 per cent) for one hour and examination of the patient by a physician. (Areas affected by CN should be treated immediately with 10 per cent solution of sodium bicarbonate and hot applications.)

SUMMARY

A report is made of some industrial hazards in connection with the manufacture of several of the gases used in industrial and police work and in warfare.

The symptoms caused are described.

Prophylactic measures adopted are described.

The treatment found useful in handling such conditions is outlined.

INDUSTRIAL DERMATITIS AND MELANOSIS DUE TO PHOTOSENSITIZATION

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For several years a manufacturer of electric conduits had observed a persistent and troublesome dermatologic condition among his workers. The physicians previously consulted had been unsuccessful in solving the problem of its origin and in relieving the workers affected, and the management then requested an investigation by the United States Public Health Service. Schwartz, suspecting photosensitization dermatitis, asked the co-author, who had not been on the case previously, to participate in the investigation. After this an inspection was made of a similar manufacturing plant in another state and of related industrial plants elsewhere, and research as to the etiologic factors concerned was undertaken.

It was observed by us that dermatitis and melanosis are not uncommon in industries where tar and pitch are handled, that the preparations are important occupational hazards and that this is not generally known in this country. A review of the literature indicated also that the mechanism of production of these dermatoses had not been determined.

INCIDENCE

More than 500 men were examined in the four factories; more than half of them had either melanosis or cutaneous lesions, chiefly dermatitis. It was observed that the condition was confined to handlers of pitch or of pitch products, but that those most intimately in contact with pitch were affected the least, while those who had the most severe dermatitis and the most intense pigmentation were outdoor workers. Indoor work, necessitating direct contact with pitch and pitch vapor and exposure to high temperatures, did not appear to be definitely associated with the development of dermatitis, but when an indoor worker was placed at yard work, an inflammation of the face invariably developed. This subsided, though the pigmentation persisted, when he returned to indoor work.

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The dermatitis was characterized by diffuse erythema and desquamation, at times associated with severe edema, and it involved chiefly the face and neck, particularly the nasolabial areas and chin, and was frequently associated with conjunctivitis and occasionally with labial herpes and cheilitis. The pigmentation was diffuse and intense, considerably darker than ordinary suntan, and it was confined to those surfaces exposed to sunlight. It was not reticulated or mottled and was not associated with abnormal pigmentation of the covered areas. Pitch comedos and folliculitis on the face, neck, hands and forearms were commonly observed, and keratoses and papillomas were found occasionally. Only 2 epitheliomas were observed, and these did not appear to be due to tar or pitch. While some men were affected more severely than others, apparently none sufficiently exposed were immune. Tolerance with persistent pigmentation was developed in some cases, but most of the men had to be rotated between various jobs, and some of them were so hypersensitive that they could not be employed in the daytime but worked satisfactorily on night shifts. The pigmentation was not permanent, but it persisted at least for several months after removal of the workman from exposure.

INVESTIGATION

Patch tests were made of 14 pitch workers and 6 control subjects. Our first tests were directed at ruling out dermatitis venenata as the dermatitis under consideration; the second, at determining if the discoloration might be a simple staining of the epidermis with pitch instead of a melanosis, and the third, at discovering if sensitization to light was the cause of this dermatosis. Having disproved the first two possibilities and confirmed the third, we attempted to determine the specific sensitizing factors, chemical and actinic, and the biologic manner in which the reactions occurred.

The testing materials included the fresh coal tar pitch before and after its use in the conduit-impregnating tanks, deposits of pitch on ventilator hoods and windows in the impregnating room, pitch dust collected from both dark rooms and sunlit yards, pitch and paper scrapings from freshly made conduits in the drying room and from conduits stacked in the yard and exposed to sunlight for six months and for four years, and three fractional oil distillates and their respective pitch residues collected at temperatures of 110 to 180 C., 180 to 240 C. and 240 to 300 C.

The following aromatic hydrocarbons extracted from the heavy anthracene oil fractions of this coal tar pitch were supplied by Dr. G. Thiessen: anthracene (Charles Hardy, Inc.), acridine 94 per cent pure (Mellon Institute), carbazole 88 per cent pure (Mellon Institute). fluorene (Eastman Kodak Co.) and phenanthrene (Eimer and Amend).

In the application of patch tests both normally exposed and unexposed sites were used, and in several instances tests were repeatedly made at fixed sites to determine if repeated exposures were necessary to produce reactions. Patches were left on for fifteen minutes, and for one, twenty-four, forty-eight and seventy-two hours. The tests were made on dry and sweaty skin, and the test material was applied dry or mixed with water, sweat, saline solution, gasoline, hydrous wool fat, cholesterol oil or liquid petrolatum. In several instances the skin was traumatized before or after application of patches. In some cases the material was left on the skin at the time of exposure to light; in most cases it was casually brushed off, as probably occurred at work; in other cases it was removed with soap and water and with carbon tetrachloride. Some test sites were exposed to light before application of test materials and others simultaneously with such applications, and several tests were made by exposing the test materials on the patches to light before applying them to the skin.

We used radiation from the air-cooled and the water-cooled mercury vapor quartz crystal burner, from a mercury vapor tungsten filament lamp, from a carbon arc lamp with therapeutic "C" carbons and from an infra-red lamp, as well as diffuse daylight on cloudy days and sunlight. The exposures to sunlight were made without screening at both summer heat and near zero temperatures, with filtration through ordinary window glass and through red, amber, green and blue glass. Intracutaneous injections of hematoporphyrin hydrochloride before and after application of patch tests with samples of pitch and acridine, followed by exposure to the different sources of light, were carried out for 5 subjects. Combined exposures were carried out simultaneously with carbon arc and infra-red rays, with ultraviolet and infra-red rays and with carbon arc and ultraviolet rays.

There were no positive reactions, either immediate or delayed, to the samples of pitch and oil when light was excluded, though in a few instances mild erythema or hyperemia was noticed immediately after removal of patches and attributed to effects of pressure and temperature or to the mechanical action of cleansing, since these reactions faded out in a short time and were not followed by dermatitis or pigmentation. One exception to these observations was in a control subject with an allergic type of chronic dermatitis, who exhibited mild dermatitis venenata after application of a number of the test materials.

Acridine sometimes produced immediate erythema, with burning and smarting sensations, which disappeared within a few minutes or a few hours and was not present on removal of patches, though several times smarting sensations returned after exposure to light and particularly

coincident with the onset of reactions to light. This same reaction was observed in a lesser degree to several of the other hydrocarbons and to pitch.

No positive reactions followed exposure of patch sites to short ultraviolet rays of wavelengths under 2,500 angstrom units (A°), and none followed exposure to infra-red rays.

The employment of the various vehicles mentioned and traumatization of test sites did not appear to have a definite influence on subsequent reactions or their absence.

Most of the patch tests in which the carbon arc lamp and a wide range of ultraviolet rays were used gave negative results, and none of the positive reactions following these exposures were strong. With positive reactions to ultraviolet rays there were sometimes associated reactions to adhesive tape and milder erythematous reactions on adjacent normal skin, indicating a hypersensitive skin or overdosage resulting in a normal erythematous response. When repeated patch tests and ultraviolet rays were applied to the same site, pigmentation developed in several instances, though with little preceding erythema. The results of combined irradiation with ultraviolet or carbon arc and infra-red rays and with ultraviolet and carbon arc rays were negative.

Positive erythematous reactions followed exposure of patch sites to diffused daylight and to sunlight through glass, and the strongest reactions followed exposure to unfiltered sunlight, regardless of temperature. Sunlight produced reactions of apparently equal intensity on previously exposed and previously unexposed sites. When exposures to sunlight were delayed until forty-eight and seventy-two hours after removal of twenty-four hour patch tests, positive reactions were obtained, but in diminished intensity.

Cleansing of the test sites with soap and water followed by application of carbon tetrachloride previous to exposure to sunlight also resulted in positive reactions. These suggested that the light-sensitizing agent is taken up by the skin. Such reactions were not confined to follicular areas; so they were probably not due to accumulations of pitch in the follicles or sweat ducts.

Strong reactions on exposed areas of the neck contrasted with mild or negative reactions on covered parts tested with pitch and ultraviolet rays were attributed to differences in sources of radiation rather than to differences in test sites, the areas on the neck having been exposed to daylight.

Patch tests with pitch that had been exposed to sunlight for an hour, for six months or for four years did not produce reactions when followed by exposure to ultraviolet or carbon arc rays, suggesting that exposure of pitch to light apparently does not so change it chemically

or physically as to enhance its photodynamic action. This is mentioned because Herrick and Sheard [1] have reported that irradiation of coal tar resulted in a chemical change and possibly in the formation of new chemical compounds. In 1 case in which mild erythematous reactions followed exposure to ultraviolet rays, the reaction was stronger to fresh pitch than to scrapings of conduits.

There were no positive reactions following simultaneous application of pitch or its components and exposure to ultraviolet rays, nor following exposure of the test sites to sunlight or ultraviolet or carbon arc rays and subsequent application of patch tests. This observation indicates that exposures to light do not so sensitize the skin as to produce reactions on subsequent contact with pitch or its components.

Positive reactions following exposures of sites of patch tests with different materials to ultraviolet and carbon arc rays were so mild that we could not always be certain of differences in the reactions to the different chemicals tested, but in several cases the strongest reactions were obtained with heavy anthracene oil (270 to 340 C., or 542 to 650 F., fraction) and with pitch residues from 30 and 40 per cent oils. Test sites frequently showed a yellow discoloration from pitch, but this could be removed or disappeared spontaneously in a few days, and its presence did not appear to favor reactions.

In most instances, when hematoporphyrin hydrochloride was injected into the skin exposure to the carbon arc light or to daylight resulted in an immediate wheal with an erythematous flare, but this was always transitory, occurred independent of the presence of a testing material and did not provoke dermatitis, nor was it followed by pigmentation except at the immediate site of the deposit of hematoporphyrin.

The "triple response" reaction, characteristic of a positive photodynamic effect, was clearly brought out on direct exposure to sunlight but was also obtained on exposure through window glass. It was not observed at any time following exposure to artificial light, and it occurred in equal intensity with acridine and with pitch. This reaction was first described by Lewis and attributed to the presence of a histamine or a histamine-like substance about the superficial capillaries.

The following observation is cited as an example of the positive photodynamic reactions obtained in this study:

A patch test with acridine was applied on a previously unexposed area on the forearm and removed without cleansing after twenty-four hours, and the area was exposed to direct winter sunlight at noon, with the temperature at 10 F. No reaction was visible at this time, but a smarting sensation was noticed after an exposure of a few minutes, and in five minutes a small erythematous macule appeared, which developed into a typical flat-topped wheal the size of a dime (the

1. Herrick, J., and Sheard, C.: Proc. Soc. Exper. Biol. & Med. **26**:33, 1928.

approximate area of the application of acridine) in fifteen minutes. Immediately after development of the wheal a peripheral erythematous flare, with sharply defined border, appeared in an area approximately the size of a quarter. The wheal reaction subsided half an hour after the beginning of the exposure to light, which was then discontinued. An area of erythematous dermatitis, directly confined to the site of application, developed on the same day and became eczematized in several days. This dermatitis persisted for a month, but pigmentation was definitely noted in four days, became intensified and persisted for several months in the exact site of the patch test. A simultaneous test with pitch dust on the opposite forearm produced a similar but more mild reaction. Control tests on one of the authors with anthracene (conduit) pitch, acridine, phenanthrene, anthracene and carbazole in an oily base, removed after twenty-four hours with soap and water and alcohol, gave negative results on exposure to a suberythema dose of ultraviolet rays below 3,200 angstrom units wavelength and positive results only to pitch after direct exposure to sunlight. The site of the test with pitch exhibited a typical "triple response" on exposure to sunlight, followed by intense pigmentation.

CHEMISTRY OF PITCH

A tar is the product of destructive distillation of an organic substance, such as coal, wood, bituminous oil or petroleum, whereas a pitch is the solid residue obtained by the distillation of a tar. The composition of a pitch therefore varies with the source of its tar and with the degree of distillation of the tar. Coal tar pitch is the only pitch with marked photosensitizing properties. Coal tar is not a specific chemical but an aggregate of several hundred such substances, of which not more than a hundred have been definitely isolated. The composition of pitch is somewhat similarly complex.

According to Obermayer and Becker,[2] tar is not actually distilled from coal in the narrow scientific sense of the word but results from condensation of the liquid products of the decomposition of coal by heat, and the complex compounds, such as the aromatic hydrocarbons, are not actually present in coal but are produced in the process of distillation at high temperatures from the phenols and naphthalenes. Tar distilled at low temperature is a relatively thin liquid, only slightly heavier than water, containing a large percentage of complex high-boiling phenolic compounds, no solid aromatic substances and little free carbon, while high temperature tar is thick, is much heavier than water and contains chiefly hydrocarbons, especially the solid aromatic substances, and much free carbon and pitch.

In the fractional distillation of the coal tar concerned in our cases, the products obtained by the manufacturer were graded as follows: crude naphtha and benzene at temperatures up to 110 C., light creosote oils and phenol oils at 110 to 180 C., medium creosote oils at 180 to

2. Obermayer, M. E., and Becker, S. W.: Study of Crude Coal Tar and Allied Substances: Preliminary Report, Arch. Dermat. & Syph. **31**:796 (June) 1935.

240 C., heavy creosote oils at 240 to 270 C. and anthracene oils at 270 to 340 C. The final pitch residue shipped to the conduit factories is an oily semisolid black substance comprising about 50 to 60 per cent of the original tar. If all the oil is distilled off such a pitch residue, the remainder is coke. The anthracene oil fraction is a heavy green liquid containing anthracene, naphthalene, phenanthrene, acridine, carbazole, diphenyl and many other aromatic hydrocarbons. These compounds not only sublime at a temperature below their boiling point and come off to some extent in the lower fractions but remain in the final pitch residue, so that it is impossible to separate them completely from the other compounds.

The boiling points of some of these hydrocarbons are as follows: phenanthrene 340 C., anthracene 342 C., acridine 346 C., carbazole 355 C., methyl anthracene 360 C. The pitch used by the conduit factories in this study was heated to approximately 360 C. and 385 C. (650 F.) in its production at the factory and reheated to 170 C. at one of the conduit factories, to 350 C. at the other and to 432 C. at a roofing plant.

Other products are road tar, which is coal tar minus its first 15 per cent of distillate and plus light water gas tar, which contains fuel oil; roofing pitch, which is coal tar with 30 per cent of its distillates removed, and fuel pitch, which is the residue after distillation of 55 per cent of the original tar. Each of these pitches has the property of producing photosensitivity, so the photosensitizing agent must be in the solid residue remaining after heating to 360 C. (670 F.).

Thiessen [3] reported the fluorescent spectrums of certain polycyclic and polynuclear hydrocarbons. The absorption spectrums of anthracene and acridine are similar and were both found by Mayneord and Roe [4] predominantly in the region of 3,200 to 3,800 Å, with a narrow absorption band at 2,500. The observations of Radelescu and Osteogovich [5] were similar, though they showed an extension of the acridine absorption band to 4,500 Å. Acridine and anthracene each have two benzene branches that are indicated in the absorption spectrums by a short wave arm at 2,500 Å and a long wave arm at about 3,700 Å. Phenanthrene, on the other hand, was absorbed farther in the ultraviolet and had a narrower absorption band, approximately 2,200 to 2,800 Å. Askew [6] found that phenanthrene has a series of five bands between 3,000 and 3,550, three bands of greater intensity between 2,700 and 3,000 and

3. Thiessen, G.: Personal communication to the authors.

4. Mayneord, W. V., and Roe, E.: Proc. Roy. Soc., London, **152**:299, 1935.

5. Radelescu and Osteogovich: Ber. d. deutsch. chem. Gesellsch. **64**:2233, 1931.

6. Askew, F. A.: J. Chem. Soc. London **138**:509, 1935.

a single maximum at 2,500 Å; 1, 2-benzpyrene, which Sannié [7] called the most active carcinogenic hydrocarbon contained in pitch, has fluorescent spectral bands at 2,544 to 3,640 Å. Mottram and Doniach [8] reported the sensitization of paramecia to light below 3,500 Å with benzopyrene, shale oil and tar (Turner). According to Seshan,[9] the absorption spectrums and the fluorescent spectrums both broaden and shift progressively toward the red as the physical state of the aromatic hydrocarbon changes from vapor, to liquid, to solid.

THE SPECTRUM

Photosensitization may be better understood by a brief review of the spectrum of radiant energy. The "ether spectrum" is divided into seven zones, which show great variations in wavelength. At one end are the cosmic rays, measuring as little as one ten-thousandth (0.0001) of an angstrom unit, and at the other are the hertzian and radio waves, measuring up to 30,000 meters. An angstrom unit is one one hundred-millionth of a centimeter (10^{-8} cm.); the hertzian waves are therefore one quintillion (10^{18}) times longer than the cosmic rays.

The shortest gamma rays of radium measure one one-hundredth (0.01) angstrom unit; the ultraviolet rays range between 600 and 3,970, visible rays between 3,970 and 7,230 Å and infra-red rays from 7,230 to 300,000.[10] The shorter the wavelength, the greater is the frequency of vibration. Ultraviolet rays of 2,500 Å have a vibration frequency of 1,200 billion times per second, while infra-red rays of 8,000 Å wavelength have a frequency of 38 billion vibrations per second.

The sunlight spectrum includes the visible, the ultraviolet and the infra-red rays. Those rays between 3,900 and 4,500 Å are designated long ultraviolet. The visible spectrum includes white light at 3,300 to 8,000 Å, which is broken up into the color spectrum with violet rays measuring 4,500 to 4,900, blue 4,900 to 5,300, green 5,300 to 5,600, yellow 5,600 to 6,000, orange 6,000 to 6,500 and red 6,500 to 8,000.[11] The spectrum of sunlight at the earth's surface contains proportionally little radiation between 3,300 Å and practically none below 2,900 and is chiefly within the range of 3,200 to 6,000.

In the artificially produced light spectrums the carbon arc is limited to the region of approximately 3,300 to 4,300, with its predominate

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7. Sannié, C.: Biochem. J. **30**:704, 1936.
8. Mottram, J. C., and Doniach, I.: Nature, London **140**:933, 1937.
9. Seshan, cited in Thiessen.[8]
10. Hausmann, W., and Haxthausen, H.: Die Lichterkrankungen der Haut, Sonderband zur Strahlentherapie, Berlin, Urban & Schwarzenberg, 1929, vol. 11.
11. Eidinow, A.: Brit. J. Radiol. **3**:112, 1930.

emission, when therapeutic "C" carbons are used, in the region of 3,800 Å,[12] while the quartz mercury vapor lamp used by us produces radiation of 1,850 to 3,200 units, with a predominance of 3,100. A mercury tungsten filament lamp used in our experiments has a range of 1,880 to 2,537 Å, with its chief volume of radiation at 2,000 and below. The maximum output and the greatest erythemogenic efficiency of the cold quartz lamp is at 2,540. Ordinary window glass absorbs all rays below 3,500. All tissue cells are considered sensitive to ultraviolet rays, the sensitizing rays being chiefly those of a wavelength shorter than 3,150. Coblentz and Stair[13] determined that susceptibility to erythema occurred at wavelengths of 2,400 to 3,300, with the maximum at 2,970, and found that the longer the wavelength, the greater is the ratio of pigmentation to erythematous reaction, though no pigmentation occurred without erythema. The photochemical erythema produced by the carbon arc rays is obtained by radiation between 3,250 and 3,960 Å.

Bachem and Reed[14] have shown that there is great variation in the penetration of the normal skin by ultraviolet radiation. Rays below 2,000 Å do not reach living tissue, being practically all absorbed by the normal corneous layer; between 2,000 and 2,500 little radiation penetrates this layer, and at 2,500 to 3,000 considerable radiation penetrates the malpighian layer and reaches the germinal layer and the corium, resulting in erythema when in adequate dosage. Visible or white light and near infra-red rays are abundantly absorbed by the blood of the corium and subcutaneous vessels, while the far infra-red rays are absorbed chiefly in the epidermis. There is greater absorption by superficial tissues of infra-red rays and of short ultraviolet rays than of the more penetrating visible rays, the roentgen rays and gamma rays of radium.[10]

PHOTOSENSITIZATION AND MELANOSIS

Whatever part it plays in melanin production, light definitely intensifies normal pigmentation in the skin and is necessary for the pathologic hyperpigmentation of certain diseases, as reported in this paper. In the production of the normal hyperpigmentation of "suntan," when the exposure has been sufficiently prolonged or intense, a biochemical reaction takes place, involving the dendritic cells and resulting in erythema, dermatitis and then pigmentation. The activating radiation is short wavelength ultraviolet, particularly of wavelengths of approximately 2,970 Å[15] Visible light with the ultraviolet radiation excluded does not

12. Blum, H. F., and Pace, N.: Brit. J. Dermat. **49**:465, 1937.
13. Coblentz, W. W., and Stair, R.: J. Research, Nat. Bur. Stand. **12**:13, 1934.
14. Bachem, A., and Reed, C. S.: Am. J. Physiol. **97**:86, 1931.
15. Coblentz, W. W.: J. Research, Nat. Bur. Stand. **8**:759, 1932.

normally produce pigmentation. Blum and associates [16] stated the opinion that normal pigmentation by ultraviolet rays is not a photodynamic reaction, since it does not require the presence of oxygen. Furthermore, a photodynamic reaction involves the presence of a photosensitizing agent. They confirmed the observation of Straub that molecular oxygen is necessary for the production of a photodynamic reaction and cited Carter as stating that only ring compounds, and only those containing hydroxy or amino groups, could be oxidized in such a reaction.

Photosensitization, sensitization to light, photochemical action and photodynamic action are four synonymous terms applied to that physicochemicobiologic reaction resulting in chemical change or destruction of living tissue through an interaction of such tissue and spectral radiation with a sensitizing substance not normally present in the tissue.

Levy [17] has demonstrated that the essential action of white light on sensitized tissues in a photodynamic reaction is identical with the action of ultraviolet light on nonsensitized tissues. In such action circulatory stasis occurs as a result of the superficial vessels' becoming permeable to blood plasma under the influence of an irritant, presumably light acting apparently through the liberation of a histamine-like body from the epithelium. If extreme, this action leads to necrosis.

An association of exposure to light with the development of pathologic pigmentation was described first in 1784 by D'Oleggio in a discussion of pellagra, though that disease is apparently not an example of photodynamic sensitization.[18]

Raab [19] presented the first experimental evidence of photosensitization. He placed paramecia in a 1:20,000 solution of acridine hydrochloride and demonstrated that when exposed to sunlight these organisms were killed in six minutes, that in diffused light they survived an hour and that when they were kept in the dark there was no lethal effect.

Von Tappeiner,[20] elaborating on Raab's experiments, demonstrated that different fluorescent substances were activated by different spectrums of light rays and that in the presence of the activating rays these chemical substances destroyed enzymes and toxins as well as infusoria. These and other similar experiments indicated that a photochemical effect on certain enzymes or analogous biologic agents may be the explanation of some pathologic melanoses.

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16. Blum, H. F.; Watrous, W. G., and West, R.: Am. J. Physiol. **113**:350, 1935.

17. Levy, A. G.: J. Path. & Bact. **32**:387, 1929.

18. Mathews, F. P.: Photosensitization and Photodynamic Diseases of Man and the Lower Animals, Arch. Path. **23**:399 (March) 1937.

19. Raab, O.: Ztschr. f. Biol. **39**:537, 1900.

20. von Tappeiner, H.: Ergebn. d. Physiol. **8**:698, 1909.

The light rays producing photosensitization are luminous rays or long wave ultraviolet rays which of themselves have no such biologic effect but which in the presence of a light sensitizer, or photodynamic substance, have an action similar to that produced by short ultraviolet rays alone in adequate dosage.[11]

Photosensitizers are chemical substances that possess the property of absorbing radiant energy, or light, and of becoming activated by it. The absorption of light, or radiant energy, by a photosensitizer results in a fluorescent action, and apparently only substances that fluoresce can photosensitize. The specific spectral beams producing such reactions are called the fluorescent spectrums of those substances.

There are many photosensitizers, acting both exogenously and endogenously. Among them are erythrosin, eosin, acriflavine (diaminomethylacridine), certain arsenicals, quinine, methylene blue (methylthionine chloride), rose bengal, the barbiturates, sulfanilamide, chlorophyll, meadow grass, figs, the gas plant, the porphyrins and numerous polycyclic aromatic hydrocarbons of coal tar pitch, such as acridine, phenanthrene, anthracene and benzpyrene.

It has been demonstrated that each photosensitizer has its own specific activating spectral beam and that light other than of its specific wavelengths will not be absorbed and therefore will not activate that substance.[21] This fundamental principle, that "only light which is absorbed can produce a photochemical reaction," is known as the Grotthus-Draper law. Blum and Pace [12] elaborated this by stating that the amount of photochemical activity is proportional to the amount of light absorbed and that a study of the absorption spectrums of fluorescent chemicals will yield an index of their photochemical activity.

Hausmann [22] reported the following fluorescent spectral zones in which the designated photosensitizers were found lethal to paramecia: red-yellow—methylene blue and methylene violet (thiazime and thiazone); yellow—oxazine and oxyzone; green-violet—azine, eosin,erythrosin, rose bengal, rhodamine III B, fluorescein, etc.; blue-ultraviolet —acridine, benzoflavine, anthracene, the anthraquinones, quinine, xanthone, etc.

Blum's [23] report of the irreversibility of the photodynamic reaction —that is, the total period of intermittent and that of continuous exposure to light necessary to kill eosin-sensitized paramecia are the same —speaks for a union, at least physical, of sensitizer and tissue protoplasm, because of the quantitative character of the reaction.

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21. Sheard, C.; Caylor, H. D., and Schlotthauer, C. F.: J. Exper. Med. **47**: 1013, 1928.

22. Hausmann, W.: Grundzüge der Lichtbiologie und Lichtpathologie, Berlin, Urban & Schwarzenberg, 1923.

23. Blum, H. F.: Physiol. Rev. **12**:23, 1932.

Blum [16] and his associates expressed the belief that all photodynamic reactions are fundamentally similar in that they are all processes of oxidation, occurring in living tissue in the presence of light and oxygen and a photosensitizer.

Whether the photodynamic agent enters into a biologic union with the cell has not been determined, but no demonstrable reaction takes place until after exposure to the rays of light specifically absorbed by the particular photosensitizer.

It has been stated that the photosensitizing substance itself remains unchanged, performing a role similar to that of a catalyzer in a chemical reaction. We believe that the photosensitizer penetrates the skin and presumably takes part in the biochemical reaction, because we have observed that reactions do not immediately follow exposure to light if the application of the chemical sensitizing agent is simultaneous with exposure. On the other hand, a positive photodynamic reaction is obtained within a few minutes following the exposure to light if the patch test has been on for hours, and both thorough cleansing of the cutaneous surface and a delay of several days after patch application and cleansing do not prevent the appearance of the photochemical reaction, though they make it milder.

Blum, Watrous and West [16] produced three different reactions in 1 person: normal erythema, urticaria solaris and a photodynamic reaction.

Blum and West [24] expressed the belief that in some diseases—xeroderma pigmentosum, for example—a foreign photoactive substance may not be involved and the hypersensitivity to light may be solely the result of an upset in some part of the normal pigment-forming mechanism of the afflicted person.

Mathews [18] expressed the opinion that xeroderma pigmentosum is not a photodynamic disease because of the absence of both a specific band of activating light and a photodynamic substance.

In discussing the action of sunlight in the production of cancer Roffo [25] stated that the carcinogenic factor in sunlight was definitely in the ultraviolet part of the spectrum and that actinic intensity and not luminosity was the determining factor. He also indicated the probability that a localized increase of cholesterol played a part.

In experimental photosensitization of animals following injection of buckwheat, Sheard, Caylor and Schlotthauer [21] determined the specific sensitizing radiations to lie in the range of 5,800 to 8,000 Å. They therefore ruled out hematoporphyrin as a sensitizer and suggested phylloporphyrin, a chlorophyll derivative. It was thought the chlorophyll present

24. Blum, H. F., and West, R.: J. Clin. Investigation **16**:261, 1937.

25. Roffo, A. H.: Bull. Assoc. franç. p. l'étude du cancer **23**:590, 1934; abstracted, Am. J. Cancer **24**:674, 1935.

in the buckwheat is converted into chlorophyllan by the gastric hydrochloric acid, which, after absorption into the blood stream, is converted into phylloporphyrin by the alkalinity of the blood. It was suggested that visible light of these longer wavelengths, which penetrates deeply but produces no biologic reaction normally, was energized by the photosensitizer.

It was suggested that the photosensitizer rendered the tissues susceptible to destruction by the energy contained in the deeply penetrating light of long wavelengths, which ordinarily does not have a biologic effect. Is it not possible that the photosensitizers absorbing the specific long wavelength rays emit secondary, locally destructive rays of short wavelength?

Cummer and Dexter [26] reported a case of erythema and bullous dermatitis followed by prolonged pigmentation following contact with the gas plant, or Dictamnus albus, and exposure to sunlight. This photodynamic effect was corroborated by patch tests, which gave positive results only when an area of normal skin rubbed with the plant was exposed to sunlight.

Fleischhauer [27] reported a case of photosensitization to a coal tar preparation, lianthral, in which the activating rays were chiefly in the shorter wavelengths of visible light but to a slight extent also in the ultraviolet. In the latter, pigment production exceeded erythema production in intensity. Photosensitization was obtained after a fifteen minute application of lianthral followed by exposure to sunlight. Reactions likewise occurred as late as seventy-two hours after removal of the sensitizer and when the test site had been cleansed with soap and water and with carbon tetrachloride before exposure to light.

CONCLUSIONS

1. Pitch dermatitis and melanosis are the products of true photosensitization resulting from exposure to specific spectral bands of light.

2. These conditions do not appear to result from chemical contact sensitization of the type of dermatitis venenata or from allergic predisposition and commonly occur in previously normal skin of normal subjects.

3. The photosensitization occurs through local exogenous activity of a specific photosensitizer.

4. We believe that these photosensitizing radiations predominate in the short wavelengths of the sun's spectrum, in the range of the blue and violet of visible light and in the long wavelengths of ultraviolet light —that is, chiefly between 3,900 and 5,000 Å.

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26. Cummer, C. L., and Dexter, R.: Dermatitis Caused by Dictamnus Albus (Gas Plant): Example of Photosensitization, J. A. M. A. **109**:495 (Aug. 14) 1937.

27. Fleischhauer, L.: Strahlentherapie **36**:144, 1930.

5. Reactions may be obtained in the mid-ultraviolet portion of the spectrum, apparently only after prolonged exposure to rays of wavelengths longer than 2,500 Å.

6. There is apparently little photosensitizing effect at the normal erythema range of approximately 3,000 Å and none below that wavelength.

7. Our investigations failed to establish definitely one specific ingredient of pitch or a definite fractional distillate of coal tar or its particular pitch residue as the photosensitizing agent in pitch melanosis and dermatitis.

8. Our tests with anthracene oil pitch and anthracene oil distillates, such as acridine, anthracene and phenanthrene, after exposure to sunlight, resulted in reactions chiefly to pitch but also to the hydrocarbons tested.

9. Because of our observation of photosensitization following exposure through glass to rays of spectral wavelengths between 4,500 and 5,300 Å and since acridine and its related hydrocarbons apparently absorb radiation chiefly at 3,200 to 3,800 and none beyond 4,500, we believe that pitch probably contains other important photodynamic substances in addition to those specific hydrocarbons suspected of causing sensitization to pitch, or that these substances emit radiation at a longer wavelength than that of their absorption spectrums.

10. Because 1,2 benzpyrene, the most active carcinogenic hydrocarbon contained in pitch, has fluorescent spectral bands at 2,500 and 3,600 Å, we believe that the dermatitis and melanosis probably result from photosensitization by different ingredients of coal tar, possessing different fluorescent spectrums from those involved in the production of epithelioma and epitheliomatous conditions.

11. Pending further experimental work, we cannot exclude the polycyclic aromatic hydrocarbons studied from participation in the production of pitch melanosis and dermatitis, but we direct attention to possible photosensitizers, as yet unrecognized, possessing fluorescent spectrums. Chlorophyll is known to be a strong photosensitizer, with an absorption spectrum in the visible fields between 4,400 and 6,800 Å, and it has been suggested by Turner that a derivative of chlorophyll may be present in pitch and may be concerned in this process.

12. We do not believe that acridine and anthracene are the sole photosensitizing agents in pitch dermatitis and present this part of our investigation as a preliminary report.

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MEDICOLEGAL COMPLICATIONS IN DERMATOLOGY CAUSED BY MASSACHUSETTS WORKMEN'S COMPENSATION ACT

J. HARPER BLAISDELL, M.D.

BOSTON

The commonwealth of Massachusetts has had industrial compensation insurance since July 1, 1912. During the past twenty-six years several sections of the Workmen's Compensation Act, as chapter 153 of the general laws is called, have been repealed and many sections added, so that today the act is composed of over 14,000 words, in 85 sections. Its purposes and provisions have been clarified—and occasionally befogged—by over 600 decisions on controversial issues by the Supreme Judicial Court of Massachusetts.

No employer of labor is compelled to carry compensation insurance, and many do not. Large corporations, like the Boston and Maine Railroad, the Boston Elevated Railway, the Boston Edison Co., the New England Telephone and Telegraph Co. and the General Electric Co., carry their own insurance. The care and the compensation given to their injured employees are much like the benefits enjoyed by the employees of insured employers.

The employee of a noninsured employer of little or no financial standing is at a decided disadvantage if he meets with a serious industrial injury. His only recourse is his right of action at common law by suit. In his suit he must prove three things: (1) that the employer was negligent; (2) that he himself exercised due care and that he was not injured by the negligence of a fellow employee, and (3) (of particular importance in the case of industrial dermatoses) that he had not assumed the risk of injury. If he successfully surmounts these three hurdles, the employee still has the problem of collecting his judgment against an employer of no financial standing.

PROVISIONS OF THE ACT

The following sections of the Workmen's Compensation Act are significant:

Section 22. Every insured person shall give written or printed notice to every person with whom he is about to enter into a contract of hire that he has provided for payment to injured employees by the insurer.

Read at the Sixty-First Annual Meeting of the American Dermatological Association, Inc., Del Monte, Calif., June 11, 1938.

Section 24. An employee of an insured person shall be held to have waived his right of action at common law or under the law of any other jurisdiction in respect of an injury therein occurring, to recover damages for personal injuries if he shall not have given his employer, at the time of his contract of hire, written notice that he claimed such right.

Section 26. If an employee who has not given notice of his claim of common law rights of action, under section 24, or who has given such notice and has waived the same, receives a personal injury arising out of and in the course of his employment, or arising out of an ordinary risk of the street while actually engaged, with his employer's authorization, in the business affairs or undertakings of his employer, and whether within or without the commonwealth, he shall be paid compensation by the insurer, as hereinafter provided.

Section 29. No compensation shall be paid for any injury which does not incapacitate the employee from earning full wages for a period of at least seven days. If incapacity extends for a period of two weeks or more, compensation shall be paid from the day of injury, otherwise from the eighth day thereafter; provided, that, except under section 35, no compensation shall be paid for any period for which any wages were earned. When compensation shall have begun it shall not be discontinued except with the written consent of the employee, or with the approval of the department or a member thereof, granted only after an impartial examination or after a personal interview with the employee by a member or employee of the department, or after failure of the employee to report for or submit to such examination or interview after reasonable notice; provided, that such compensation shall be paid in accordance with section 35 if the employee in fact earns wages after the original agreement or decision is filed.

Section 30. During the first two weeks after the injury, and, in unusual cases or cases requiring specialized or surgical treatment, in the discretion of the department, for a longer period, the insurer shall furnish adequate and reasonable medical and hospital services, and medicines if needed, together with the expenses necessarily incidental to such services. The employee may select a physician other than the one provided by the insurer; and in case he shall be treated by a physician of his own selection the reasonable cost of the physician's services shall be paid by the insurer, subject to the approval of the department. Such approval shall be granted only if the department finds that such services were necessary and the charges therefor were reasonable.

It will be noted that under the act a physician cannot obtain compensation or the injured employee receive free medical care for more than two weeks unless the Industrial Accident Board in its discretion finds that the case is unusual or that the patient requires specialized or surgical treatment. There can be no appeal from the board's refusal to make such a finding. Actually, for many years both the insurers and the board have regarded all bona fide industrial injuries as being "unusual or requiring specialized or surgical treatment," and the injured employee receives compensation and medical care until the disability ceases.

The sole right of a physician selected by an injured employee to obtain payment for his services rests on the question whether a selection

of the physician, within the meaning of the act, was made by the employee, which question is determined by the board. The finding of the board on this question is one of fact.

The board's position, as shown by its rule, constantly reiterated, that "an industrial case coming into the hospital as a hospital case cannot be made into a private case in which the attending physician may collect from the insurance company for his services as in a private case," is that it does not propose to allow compensation to a staff physician in such cases if it can possibly avoid finding that a selection was made.

Further, the aggrieved physician has the right of review of the board's decision solely on questions of law. The board's findings of fact are final and conclusive unless the Supreme Judicial Court can find, as a matter of law, that there was no evidence on which these findings could have been based. The Supreme Judicial Court has held repeatedly that it will not interfere with findings of fact made by the board, which has had the opportunity of seeing and hearing witnesses, except in cases in which its findings of fact were wholly unsupported by evidence or were based on mere conjecture and surmise rather than on evidence.

For years this situation has placed an unjust burden on dermatologists and physicians generally who are on the staffs of the larger hospitals, and it is still a subject of active controversy between the Massachusetts Medical Society, through its public relations committee, and the board. The Supreme Judicial Court has yet to make a final and comprehensive finding on this issue.

Section 34. While the incapacity for work resulting from the injury is total, the insurer shall pay to the injured employee a weekly compensation equal to two-thirds of his average weekly wages, but not more than eighteen dollars nor less than nine dollars a week, unless the weekly wages of the injured employee are less than nine dollars, in which case said weekly compensation shall be equal to his average weekly wages, but in no case less than seven dollars a week where the number of normal working hours of the injured employee in a week are fifteen or more; provided, that the period covered by such compensation shall not be greater than five hundred weeks nor the amount more than forty-five hundred dollars.

Section 35. While the incapacity for work resulting from the injury is partial, the insurer shall pay the injured employee a weekly compensation equal to two-thirds of the difference between his average weekly wages before the injury and the average weekly wages which he is able to earn thereafter but not more than eighteen dollars a week; and the amount of such compensation shall not be more than forty-five hundred dollars.

The act contains absolutely no words attempting to define industrial injury or industrial disease. There is no limiting of compensation to certain specified dermatologic diseases, to certain dermatologic diseases caused by specific materials or to recognized hazardous occupations. Section 5 provides that "the department may make rules consistent with

this chapter for carrying out its provisions. Process and procedure shall be as simple and summary as reasonably may be."

Unconfined by definitions and unhampered by precedent, the board is completely free to judge each disputed case solely by whether the alleged injury or disease is in any way causally related to the work of the employee.

Disputed cases are heard by a single member of the board, and an appeal from his decision for a review by the full board can be taken by either party within seven days. The full board may revise the decision of the single member in whole or in part or may refer the matter back to the board member for further findings of fact. Appeal may be taken from the findings of the full board to the Superior Court and in turn to the Supreme Judicial Court, but such appeals come to these courts on questions of law and not on questions of fact.

Although the provision that the board may make rules has been a part of the statute since its inception in 1912, inquiry for a printed list of rules or precedents brings the answer "There is none." Repetition of thought in identical language occurs frequently in the findings of the board—for example, in the disputed rule that "hospital cases cannot be made into private cases"—but because there are no printed rules to act as precedents, the repetition of thought acts only as a finding in the particular case before the board. The absence of printed rules frees the board from the possibility of reversal when its findings in similar cases are contradictory, except when there is clearly demonstrated prejudice or complete lack of evidence.

STANDARDS RELATING TO THE PRACTICE OF DERMATOLOGY

In spite of the lack of printed rules and precedents, a number of clearly understood and definite standards have been established. Freely interpreted to apply to the dermatologic situation, they seem to me to be generally as follows:

1. Any primary dermatosis related in any degree to employment is compensable until the injured employee is completely well and able to return to his previous occupation.

Contrary to one of the basic principles of law, that a person is assumed to be innocent until he is proved guilty beyond reasonable doubt, the board regards any dermatitis as being probably related to employment unless the insurer can prove definitely that it is not. In borderline cases the employee always receives the benefit of the doubt.

The injured employee is his own master in deciding whether he will continue to work while undergoing treatment, if he is able to, and receive partial compensation, if it is due him because of a lessened earning capacity, or will stop work completely and receive full compensa-

tion. The older employee who is a steady worker in the higher wage brackets stops work reluctantly and returns to work eagerly. The transient laborer on a low wage and the housewife who works seasonally to augment the family income stop work at once and will not agree that any work is possible until the last pink vestige of the dermatitis has disappeared. Such transient workers often continue to receive compensation for long periods, with a total expense that is out of all proportion to the injury received.

The following case is one in point:

CASE 1.—On Aug. 6, 1934, a young woman, a shoe stitcher, noticed a mild dermatitis on several fingers of both hands. The greater part of the outbreak cleared up in six weeks, but she refused to return to work until the last traces had disappeared from a dime-sized area on the left middle finger. I believed that the disability had ceased, but at a hearing a member of the board disagreed, and further medical treatment was given. This single lesion cleared up repeatedly, but the employee would decline to sign a release, and by the time of the next hearing the finger would again show some trivial evidence of an outbreak on the same dime-sized area. Fifteen months passed and four hearings were held before a discontinuance was ordered by the board. The total compensation paid to this employee was $567; the medical fees and medicines cost $112.25, and the cost of the hearings was $185. The total cost to the insurer was, therefore, $864.25.

Assume that a man has made a complete recovery from contact dermatitis acquired in an occupation which precludes adequate protection of the skin from the substance causing the trouble. What is the answer to the question "Is this man able to return to his former work?" My answer is "No." "When will he be able to return to work?" My answer is "I don't know," which is often received with pitying disgust by the commissioner, the attorneys and the employee alike. The employee pleads that his former occupation is the only one that he knows and the only one in which he can earn his average wage and that he is unable to find any other work; as a result, the insurer continues to pay compensation either in whole or in part. The lengths to which this situation can be carried are illustrated by the following cases:

CASE 2.—A shoe laster stated on Jan. 14, 1935, that he had been in and out of work twelve times in the previous two years on account of an eruption on his hands. He handled three different types of fully tanned leather which are used without further processing in shoes sold to the public. Examination showed mild dermatitis on the backs of both hands and both wrists, with redness, slight swelling and fine vesiculation. The palms and fingers were normal. Repeated patch tests showed a strongly positive reaction to tan inner sole but no reaction to the two black leathers used. The dermatitis cleared up completely in a few days. The man was undoubtedly sensitized to the tan leather, but there was nothing to show that he could not work safely with other leathers or do other kinds of work. After repeated hearings, in which the employee argued pleasantly that he was incapacitated from working in his trade and was unable to find any other kind of work, the case was finally settled, two years later, on Feb. 15, 1937. He had received

compensation for ninety-six weeks of total disability and thirty-four weeks of partial disability, amounting to $1,902.57. At the final hearing a "lump sum" settlement of $450 was made, in order to release the insurer from any further liability. The medical care and medicines cost $165.87 and the hearings $161.94. The total cost of this case to the insurer was $2,680.38.

CASE 3.—A shoe ironer was first seen on Jan. 5, 1931. His occupation is one of the most hazardous in the shoe industry, as it brings the fingers of the worker in contact with a constantly changing stream of dyes, chemicals and heat. At that time he had typical shoe ironer's dermatitis of the fingers and hands. He was next seen on July 11, 1934, three and one-half years later. In the interval he had been under the care of his own physician for some months and had been to a dermatologist about twenty times. He claimed that during this period his hands had never been completely well. For the preceding ten months he had not gone to any physician but had continued to use at irregular intervals the ointments prescribed by the dermatologist. At the time of his visit the skin of several fingers was mildly irritated. He was seen again on May 7, 1935, ten months later. In the meanwhile he had not gone to any physician, although he claimed that the dermatitis, which was then present, had been continuous since the previous visit. Six months later the situation was unchanged, except that the costs of compensation were steadily mounting. On Nov. 18, 1935, he was admitted to a hospital under my care, and he was discharged completely well exactly five weeks later. A hearing for discharge from compensation could not be held until March 11, 1936, and he appeared before the board member on that date with acute dermatitis on both hands of four days' duration and of unexplained origin. His compensation was continued. His next examination was on Jan. 26, 1937, ten months later. On this occasion he said that the previous unexplained sudden and severe dermatitis had cleared up spontaneously in three weeks and that the only treatment his hands had been receiving was an occasional application of olive oil. Aside from a small amount of winter chapping across the knuckles of three fingers, his hands were well. In my report to the insurer I said "I predict that on the occasion of the next hearing his hands will be badly broken out." Six weeks later another hearing was held, and the employee appeared with another acute attack of dermatitis, of a few days' duration, affecting both hands. The board member chose to consider this outbreak also as a complication of the original industrial dermatitis. Thereafter the insurer paid without protest. For nearly seven and one-half years this employee, who had no dependents, received a weekly compensation of $11.83. Finally the payments stopped automatically, when the total paid reached the full amount allowed by law, $4,500. The bills for medical care and legal costs amounted to about another thousand dollars.

For many years the insurer of the industrial organization in whose employ the patient acquired the original contact dermatitis was responsible for all recurrences, irrespective of the lapse of time or the number of different employers since the date of the original outbreak. I have spent many fretful moments on the witness stand trying to clarify the differences between recurrence, reoccurrence and new injury. (In those days it was not unusual to see the attorneys of four or five different insurance companies striving by genealogic research in the records of employment to pin the liability on some luckless company which had had a claim made on it by the employee many years before and likely

for a condition entirely different from the present disability.) Wisely, the board now rules that when an employee is once cured of his industrial dermatitis and returns to work, any further outbreak is a new accident, with the liability falling on the insurer of the concern by whom he is employed at the time of the second outbreak, whether such concern is the original employer or an entirely different one.

The liability is determined in many cases by whether the occupation includes an inherent danger of a specific type of infection. Erysipeloid in a fish or meat clerk, cutaneous tuberculosis in a veterinarian or cattle handler, folliculitis in an oil worker, impetigo contagiosa in a laundry worker who handles dirty clothes, fungous infection in a soda clerk, yeast infection in a fruit or vegetable handler and paronychia in a scrub woman are all examples of probably compensable cutaneous infection.

2. A preexisting condition aggravated by an industrial injury or disease is compensable until it is restored to the state in which it was before aggravation. For example:

A shipping clerk with varicose veins is struck on the shin by a hand truck. A varicose ulcer and eczema develop. This man will receive compensation and treatment until both conditions clear up. If they refuse to clear up without removal of the veins he is entitled to the necessary injection treatments.

Another shipping clerk with latent syphilis receives the same sort of injury, and a gumma develops at the site of the blow. Treatment to heal the gumma will be required, and compensation will be paid as long as the employee is unable to work. A cure for the latent syphilis is not required.

A carpenter has had psoriasis for many years but never on the palm. After several weeks of steady work following a layoff, palmar psoriasis develops. The chances are that his claim for compensation will be allowed on the ground that a preexisting disease was specifically aggravated in the ordinary course of his employment by traumatic friction of his palms. I should testify in favor of such compensation.

On the other hand, if the same man acquires palmar psoriasis which is incidental to a new or recurrent generalized outbreak, his condition, I believe, is a constitutional disease to which any one is liable and is in no way causally related to his employment.

A machinist aged 60 with multiple keratosis on the face receives a blow on the cheek from a revolving belt. The accident is noted at the time of its happening. Several weeks later epithelioma appears at the site of the blow. This lesion will be accepted as an industrial disease and will be treated until well irrespective of recurrences. The employee will not be entitled to compensation for epithelioma that may develop elsewhere on the face.

In a case which came under my observation a waitress received a burn on the left palm and wrist from a hot coffee urn. Considerable secondary infection followed, and the burn and its sequelae lasted for five weeks. A week after all traces had gone four papules typical of late secondary syphilis appeared exactly in the burned area, and these were followed during the next month by many similar papules on the legs. A claim for compensation was made. It was my opinion that, although the first four papules, which occurred at the sites of injury,

were undoubtedly activated by the industrial accident, they were a component part of a constitutional disease, and the role of the accident in their production was not causal but incidental.

In Massachusetts industrial dermatitis and fungous infection literally go hand in hand. Repeatedly, long-continued dermatitis of the hands or fingers subsides, only to reveal the typical translucent vesicles of a mycotic infection which, if the history can be trusted, the employee has never before had. Often the reverse is true, and a comparatively trivial industrial dermatitis lights up an old fungous infection. If the invasion is a new one, the areas involved are usually much smaller and more individualized than the areas of the original industrial dermatitis.

When the fungous infection is a complication of an industrial dermatitis, the employee is entitled to both treatment and compensation until his skin is well, an end which cannot be attained for many weeks after a simple dermatitis would have disappeared. The complication is far more costly than the original dermatitis. When the fungous infection is an old one, the employee is entitled to treatment and compensation only until the dermatitis is healed and the skin cleared of the effects of the exacerbation and not until the fungous infection is cured. As a practical matter, it is impossible to determine when the effects of the dermatitis end and the symptoms of the fungous infection begin. Unless it can be proved that the employee had a clearcut fungous infection of either the feet or the hands, with or without accompanying "ids," and, still more important, that he was engaged in an occupation which would preclude any dermatitis, most insurers accept the complication without a struggle and settle as best they can. It is in this type of case that the "lump sum" settlement proves most useful and is equally fair to both employee and insurer. With the consent of the full board, the employee is allowed to accept an agreed-on sum of money over and above his weekly compensation and the cost of medical care. After acceptance no claim can be brought against that insurer because of further incapacity or for treatment relating to the settled case. Once the employee has returned to work, any new outbreak is classified as a new injury and the claim is against the insurer of the new employer.

It is obvious to the dermatologist that many employees who have recovered from an industrial dermatosis should not return to the identical working conditions or even the industry that produced the injury. This fact is often impressed on the employee at the time of his discharge from treatment and is called to the attention of the insurer, but no organized attempt is made by insurers to see that such recommendations are carried out. Many employees simply drift back blindly into the same trade with another employer, and the circle of disability and compensation starts all over again in a short time. The larger employers, with sufficient facilities, can give the employee some measure

of protection if he returns to the same type of work or can place him in an entirely different field, but the employer may be hampered by his layman's ignorance of what is necessary for protection. A tanner provided gauntlets for a certain operation but allowed the men to work with their arms bare from the gloves to the shoulders. A mixer who had acquired sensitivity to sodium silicate was given a job in the yard on his return after two months' disability; his new job was in an entirely different operation and was in a separate department of the plant. However, the first day of work found him stacking boards from the bins containing silicate of soda, and a recurrence was immediate and severe. In my opinion, insurers would be well repaid by the establishment of a central agency to which problems of industrial reemployment could be referred.

IMPARTIAL EXAMINATIONS

Since the Workmen's Compensation Act went into effect in 1912, the board or any member thereof has had the right to appoint a duly qualified physician to examine the injured employee, and that physician's report is admissible as evidence in any proceeding before the board. This impartial physician is not required to be present at subsequent hearings, either to testify as to his findings or to be subjected to cross examination on the points in dispute. His findings are not binding on the board, the employee or the insurer. Impartial reports, however, in spite of the confused and unfavorable circumstances surrounding their making, do carry considerable weight with the members of the board.

The employee presents himself at the office of the impartial physician, often accompanied by an interpreter as unintelligible as himself and always unaccompanied by any factual records of his employment, of the irritants involved and of the treatments, which may have spanned weeks or months. The patient tells his story, invariably colored in some degree in his own favor. The dermatologist examines the skin, from which the eruption may have vanished days or weeks before, and, after trying to separate wisely the wheat from the chaff in the patient's story, proceeds to give his best impartial judgment as to whether the original dermatosis was causally related to the patient's employment. However excellent the theory may appear on paper, in actual practice the majority of such impartial examinations add little to the total of useful knowledge in the field of industrial dermatoses.

BOARD OF MEDICAL REFEREES

In 1935 an attempt was made to establish an impartial medical trial board of three members, whose function would be fact finding and whose decisions would be binding. The three physicians were to be

selected by the Industrial Accident Board from a list of all registered physicians in the commonwealth, as prepared by the board of registration in medicine. Section 9B says, in part:

> In the event of any employee making a claim for compensation alleging that his injury is due to an industrial disease, the industrial accident board shall submit the claim to three physicians who shall be impartial. Such three physicians shall be known as industrial disease referees. They may make such examinations of the employee and cause to be made such inspections of the place or places of employment as they deem necessary, and shall report their diagnosis to the department. The diagnosis shall be made by a majority vote of the referees, and shall be included in the decision of the single member and in the decision of the reviewing board, and such diagnosis shall be binding on the parties.

Certain practical difficulties arose at once in the carrying out of the provisions of this section. Originally the section was added to the act to enable the board to determine when tuberculosis, pneumonoconiosis and silicosis existed and were causally related to the patient's employment. Claims for compensation for this type of disability were so numerous and professional opinion as to its status so conflicting that the quarrying industry of the state was seriously disrupted for several years.

It should be noted that it is mandatory under this section for the board to refer all claims for industrial disease to the three referees. Dermatosis is ordinarily classified as a disease both by the medical profession and by those states which do not include diseases under their compensation benefits. To refer each of the some 600 cases of industrial dermatosis reported each year to three referees who are paid $15 each for every examination would place a serious and totally unnecessary burden on the insurers. Availing itself of its right to make rules, the board decreed that for the purposes of this section dermatosis is an injury and not a disease and that the referring of such cases to the referees is optional within the discretion of the board member. Nevertheless, dermatoses are still tabulated in the annual report of the board under occupational diseases.

The section limits the findings of the referees to a diagnosis applicable only to the condition found at the time of the examination. No expression of opinion as to whether the condition is of industrial origin is permitted, and a diagnosis like "dermatitis industrialis," which would imply a causal relation, is not allowed. It frequently happens that at the time of the examination the employee presents no evidence of any disease of the skin, although from the history it is evident that he has had an industrial dermatitis. "No disease" is then the only diagnosis possible for the referees to report. The fact that the section specifies that the diagnosis shall be binding on all parties has prevented the granting of compensation in bona fide cases. To prevent such an

obvious injustice the board now rules that the referees' diagnosis is binding and final only for the day of examination, and the board's decision may be based on either previous or subsequent evidence as to the industrial origin. Here again an apparently excellent theory works stupidly in actual practice. The late Dr. C. Morton Smith, of Boston, who probably made more impartial examinations than any other dermatologist in the state, told me repeatedly that in the majority of cases his impartial opinion was of no practical value to the employee, the insurer or the board. From a dermatologic point of view this section might well be repealed.

THE PATCH TEST IN COURT

In the office or the clinic the patch test offers sound evidence concerning the cause of industrial dermatitis of the contact type. On the witness stand the patch test adds mightily to the tribulations of the conscientious dermatologist, who desires his testimony to be both truthful and intelligent. The commissioner in the hearing room, the judge and jury in the courtroom and the lawyers at the counsel table all desire a cleancut unequivocal answer as to whether the result of a given patch test incriminates or absolves the material under suspicion. Although of value in medical discussions, in which they are understood, such terms as allergy, allergen, hyposensitivity, hypersensitivity and false positive, false negative and delayed reaction are anathema in the courtroom and serve only to befog issues on which dermatologists themselves are far from being in agreement. One may well subscribe to the advice given me many years ago by a keen judge, who said: "On the witness stand there are only three answers, 'Yes,' 'No' and 'I don't know,' and the best of these is 'I don't know.' "

One pitfall is always to be avoided. The physician should never attempt to give direct testimony about the result of a patch test of his own making unless every step of the procedure was done by him personally or observed with his own eyes. The application or removal of the patch by an assistant or the interpretation of the reaction by the patient or a technician completely vitiates the result as being of his own knowledge, and the alert opposing counsel will have his prompt objection sustained on the ground that such testimony is hearsay and irrelevant.

Nor should one give an expert opinion concerning the meaning of the reaction to any patch test unless the hypothetic question includes sufficient data to enable one to substantiate such an opinion. Like all other immune-biologic tests, the patch test is of etiologic significance only when its results are corroborated by the other clinical and laboratory evidence, including the history, the subsequent course and particularly the results of elimination of and reexposure to the suspected irritant.

Have dermatologists sufficient knowledge today to agree on any common ground in the interpretation of reactions to patch tests? There are no conditions under which I feel sure that an unequivocal answer is correct. Nevertheless, when a positive reaction to a substance or material which is inherently nonirritating takes place within forty-eight hours in an area of entirely normal skin adjacent to the dermatitis, it provides strong evidence that the given substance or material is a factor in the production of the dermatitis. Conversely, a negative reaction under the same conditions has great weight and tends to absolve the substance or material. At once the burden of proof is shifted to the opposing party to demonstrate that the results of the patch test are unreliable evidence.

The dermatologist on the witness stand swears "to tell the truth, the whole truth and nothing but the truth"; yet he is aware of such significant questions as the following:

How essential is it for the conditions of the patch test to simulate as closely as possible the conditions under which the employee's skin is exposed to the suspected irritant?

Is a positive reaction negated by the fact that the strength in which the suspected material is used under working conditions is widely different from its strength in the test, by the fact that the material is used dry under working conditions and applied wet for the test or vice versa or by the fact that the material comes in contact with the skin in the open air for short periods during the forty hour work week but is applied under a sealed dressing for from twenty-four to forty-eight hours during the test?

Should one express the opinion that a negative reaction to each of a number of substances applied separately rules out the occupation as a causal factor when these materials always come in contact with the employee's skin in one or more combinations?

Should a positive reaction after from five to eight days be called a delayed indictment of the suspected material, or is it a sensitivity of that particular area set in motion by the test itself?

When a subsequent test shows a positive reaction after the conventional two days, does it clinch the argument that the five to eight day reaction is due to a sensitivity set up by the test itself rather than by the material in question?

Do subsequent and consistent five to eight day delayed reactions unquestionably indict the suspected material?

If it is possible for the skin to have a polyvalent hypersensitivity, in which it is sensitive not only to the material producing the industrial dermatitis but to other substances as well, under what conditions can a true positive reaction be distinguished from a false positive reaction?

If a false negative reaction is the result of acquired hyposensitivity following the outbreak, how can such a reaction be distinguished from a true negative reaction? If subsequent tests give positive reactions, are these true positive, or are they false positive reactions caused by sensitivity acquired from repeated testing?

The investigating committees of the American Dermatological Association and of the American Medical Association will deserve the profound gratitude of the testifying dermatologist if their studies clarify these confused and perplexing questions.

CONCLUSIONS

Twenty-six years of experience have proved the Workmen's Compensation Act of Massachusetts, which is of the blanket type and is unhampered by restricting definitions of the included diseases, irritants and hazardous occupations, to be not only workable but to be, in general, just to labor, industry and the medical profession.

Three changes in the present law would appear to me to be helpful. 1. Staff dermatologists should be entitled to compensation for the treatment of industrial dermatoses in their own hospitals. 2. Proper certification that an attack of industrial dermatitis is cured should stop the employee's compensation until the board comes to a final decision in the case; under the act as it stands compensation continues for many weeks during the interval before the final adjudication. 3. The functioning of the impartial physician and of the board of medical referees is largely unsatisfactory to all parties, and the sections of the act governing them should be completely revamped.

The establishment of a central agency to which problems of industrial reemployment could be referred would prevent many expensive and recurrent attacks of dermatosis.

The principles of patch testing should be clarified, so that the present conflict between the opinions of testifying dermatologists may be reduced to a minimum.

45 Bay State Road.

ABSTRACT OF DISCUSSION ON SYMPOSIUM ON INDUSTRIAL DERMATOSES

Dr. C. Guy Lane, Boston: These papers—I am including Dr. Osborne's for my purposes at present—represent four major items with reference to industrial cutaneous disease: (1) cutaneous manifestations, (2) problems of sensitization, (3) the processes to which the various applicants for compensation are exposed and (4) matters of compensation and the legal aspect.

In regard to cutaneous manifestations: Dr. Downing has presented charts showing various diseases which are constantly coming up before dermatologists and other physicians with reference to possible industrial aspects. Dr. Miller has

emphasized chronic granulomas as possibly compensable and has stressed well, I think, the matter of syphilis. The dermatologist by reason of his interest, training and experience should be relied on for the interpretation of these manifestations, and he should do all possible in the way of educating industrial commissions and insurance companies with regard to these manifestations which occur on the skin. Dermatologists will be called on by insurance companies, employers, boards and commissions, and I believe should take the work not on a partisan but on a strictly impartial basis in order to render an accurate opinion.

With regard to sensitization: While Dr. Osborne talked mostly of children, many of his statements apply to questions which arise constantly in cases of so-called industrial disease and those coming up for compensation. The cases which he presented have many analogies, I feel, with cases in which there is a possibility of industrial origin. The question of multiple sensitization—sensitization by a previous attack of dermatitis to some other agent—also constantly arises. The patch test and its significance have been discussed by two other physicians. I think that dermatologists should take still more interest than they do at present in the industrial relations of allergic persons and in the possibilities of sensitization while these persons are on their various jobs.

In regard to processes: Drs. Cole and Driver have emphasized the manufacture of gases and their effects on the skin. I think that similar analyses of various trades should be undertaken in this same spirit, with the idea of developing definite opinions on such matters. Take, for example, the oil industry, which was so well studied years ago and for which preventive aspects were supplied. Still further similar studies are needed in the trades. Drs. Foerster and Schwartz, with their article on industrial photosensitization, I believe, deserve special attention. All the members will be interested in reading this article and seeing the method of attack. It appears to me, one might say, almost as an ideal attack. Here are the matters presented: The problem of the industrial causation is raised; there is careful investigation of the subjects; there is examination into the situation at the plant and at plants and factories in which similar exposures are found; chemical analyses are made; there have been coordination of the data and satisfactory solution of causes, and preventive methods have been adopted. What better can be done for preventive medicine than this? I think that so far as the preventive end is concerned, trained safety engineers have a far greater interest in preventive medicine than do physicians—greater than dermatologists on the average and greater than industrial physicians. It has been my fortune to talk with a number of them, and it has been most interesting to see and to feel their interest in the problems of preventive medicine. Dermatologists should think more in terms of preventive medicine, and I know of no field in dermatology in which the results may be of as much value.

As to the matter of compensation and its legal aspect: We dermatologists may be interested in the diagnosis and in the treatment of cutaneous disease and in investigation of causes, but today in the situations which arise I believe that we must take more interest in the insurance and the legal aspect, in order both to contribute our share to these fields, and to retain these fields for dermatologists. We must be ready to go to court, attend hearings and be familiar with the procedure in order to play our full part as physicians and dermatologists.

I cannot say much at this time with reference to criteria or definitions, as they vary greatly in different states, but I believe that dermatologists should play a part in formulating definitions and in formulating criteria of diagnosis and cure for use by industrial accident commissions, dermatologists and others. The

Council of Industrial Health of the American Medical Association, which has already been established (and I feel that this establishment has been largely stimulated by dermatologists), will be a most important factor in this particular field. I hope Dr. Osborne in his discussion will tell more about the establishment of this council and its purposes, so that the members can all contribute as much as possible to this most important field of preventive dermatology.

DR. LOUIS SCHWARTZ, New York: I like to feel that the presentation of so many papers on this subject before this learned body shows that industrial dermatoses are beginning to assume their rightful importance in American dermatology, and that the efforts of the Public Health Service to stimulate interest in the subject are showing some signs of success. Prior to 1928, when the office of dermatoses investigation was established, there was only a casual interest among most dermatologists in the subject of industrial dermatoses. A few leading dermatologists located in industrial centers were the only American contributors to the literature on the subject. Some of them are present at this meeting. Now, however, not only dermatologists but general practitioners, insurance companies, compensation boards and labor unions are eager to know more about it. Indeed, so great is the interest in industrial dermatoses that even the workers in some of the larger factories talk familiarly about patch tests. The paper presented by Dr. Downing, which analyzes 2,000 claims for compensation for industrial dermatoses occurring in his own practice, illustrates what a large part of dermatologic practice industrial dermatoses now comprises, especially in large industrial centers, and how knowledge of the subject can spread among the workers.

The patch test, which a few years ago was used only as a diagnostic procedure by a few advanced dermatologists, is now being used by all of them and abused by many general practitioners and industrial physicians. As a result of this abuse its value is now being questioned. In my experience it has been found to be a most helpful diagnostic procedure, but it should not be relied on as the sole criterion on which a diagnosis is made. The one who is to use it should remember that it does not simulate actual working conditions. He should be familiar with the proper technic of application. He should be familiar with the nature of the chemicals or substances with which he is testing. He must know what to expect in the form of a reaction and how to evaluate it properly, and he should understand the patient's occupation and how the chemical comes in contact with the skin during the patient's work. He should also remember that there are many chemicals in such substances as insecticides, glues, cements and oil compositions, and he should endeavor to discover the actual irritant and not be contented simply to state that the dermatitis is due to glue, or insecticide, or cutting oil, or what not. A dermatologist who is familiar with these facts will find the patch test a valuable link in the chain of evidence on which he will hang the diagnosis of occupational or nonoccupational dermatitis. He will not make a patch test with pure primary irritants, such as volatile solvents or insecticides, or do repeated patch tests with known sensitizers, such as nitro and nitroso compounds. In this connection I think it will be worth while for the members of this association to work out the maximum concentrations of the primary irritants that can be applied as patch tests for twenty-four hours on the normal skin without causing a reaction. This could be done in the course of a year if each member would work this out with a number, say five, of the primary irritants. The results could be published and would be valuable to dermatologists in the diagnosis of occupational cutaneous diseases. It must be acknowledged that the origin of all disputed occupational dermatoses cannot be determined by the patch test in a

manner to satisfy all the litigants. Especially is this true of chronic dermatitis when there is a polysensitivity or a dermatomycosis or of complicating infection. This should not discourage dermatologists from using the patch test, however, because even the Supseme Court disagrees on interpretation of law, and yet it renders a decision. Just as a decision of disputed legal matters, however, is left for the Supreme Court to make, so should disputes as to occupational dermatoses be left to the decision of the impartial dermatologists who are familiar with industrial processes and industrial irritants. This is, in my opinion, a better way than for a lay referee to decide after hearing the biased, often diametrically opposed testimony of physicians called by the litigants because they knew in advance just how these so-called experts would testify. The office of dermatoses investigation of the Public Health Service has advocated that compensation boards should appoint impartial dermatologists to examine all disputed claims for occupational dermatoses, and that the referees should accept the decisions of such impartial dermatologists as final. The office shall continue its work toward a better understanding of occupational cutaneous hazards and their prevention with even greater zeal than before, knowing that now it has the valuable cooperation of dermatologists and therefore can expect better and more rapid progress.

A few words about prevention: I believe that cleanliness is the major part of the prevention of occupational dermatoses. Compulsory shower baths after work, daily change to clean working clothes, cleanliness of work rooms and machinery and total enclosure of processes, so that the worker does not come in contact with irritating chemicals during any step. Where these precautions are not possible there should be adequate local exhaust hoods over dusty or fume-evolving processes and general suction ventilation of work rooms. Protective clothing should be properly worn; sleeves should come over the tops of rubber gloves and not under them, in order to prevent the entrance of irritants into the gloves; rubber boots should be covered by trouser legs for the same purpose. Respirators should be cleaned daily. Maintenance crews should take special precautions when they are called on to repair equipment containing irritants, because in most of the large factories in the majority of cases dermatitis occurs among maintenance crews. Rules for safety should be rigidly enforced. Men caught disregarding them should be discharged; this will serve as an example to others to obey them. Workers who are hypersensitive as shown by repeated attacks of dermatitis should be transferred to other jobs; in this way a comparatively immune crew can be built up. Protective ointments should be used only pending the installation of better methods of prevention. When used they should be of known composition, and each ingredient should have a definite reason for being in the formula. At best I believe that the protection they give is more because they are usually washed off afterward and this act of cleanliness removes the potential irritant than because they have any chemical or physical protective action.

I shall not go into the subject of medical treatment of occupational dermatoses, but I do state that persons with mild eruptions should be given protective clothing and soothing applications and continued at work in the hope that an immunity will develop, or, as the workers themselves say, they will become "hardened" to it. This phenomenon occurs often. If after a reasonable length of time the worker does not get well, he should be removed from the job. All persons with severe occupational dermatitis who cannot get well while at work should be removed from the job and never again returned to it.

DR. JAMES H. MITCHELL, Chicago: Discharging a man these days seems to be much more difficult than would be indicated by Dr. Schwartz's statment. Dr. Rothman, would you care to say a word?

DR. STEFAN ROTHMAN, Budapest, Hungary: I am in charge of the dermatologic outpatient clinic of the Institute for Social Medicine of the Hungarian government. I think that data concerning industrial eczema in Hungary may be of interest. They are similar to those which Dr. Downing has presented. In 1937, 1,500 patients with dermatologic conditions were treated, 206 of whom had industrial eczema. They were all given patch tests, the number depending on the history of the patient. In 53, about 26 per cent, of cases the eruption was caused by crude machine oil or by one of the other kinds of oil used in machines. The second large group, 31 patients, or about 15 per cent, consisted of persons using organic cleaning solvents, such as purified petroleum, benzine and turpentine, or soaps containing coal tar, formaldehyde or turpentine. Patients sensitive to turpentine are often not sensitive to the rectified product, but are sensitive to the one used in their shop. Another group, 17 persons (8 per cent), were cement workers. Their sensitivity to lime, mortar or cement could as a rule not be demonstrated by patch test, but it was always suggested by the improvement which occurred when the patients stopped working. The fourth group consisted of 39 persons, 90 per cent household workers, who were exposed to alkaline soaps and soda. The fifth group was that of bakers, 14 per cent. Most of them were sensitive to coarse flour containing some bran and not too fine flour. None of them were sensitive to substances used as baking powder or for bleaching. There were some cases of primrose eczema. Three patients were gardeners, but 4 were waiters in one big hotel where primrose was favored, as it is in spite of frequent warnings at many places on the continent. A case of sensitivity to fly poison, extensively used on all farms, was most interesting. Another interesting case was that of a former employee of a street car company who had handled coins throughout the day. For two years he had a severe exudative eczema before the sensitivity to nickel and copper was discovered by testing with solutions of nickel and copper sulfate containing 1 part in 10,000. This is a small group of cases, but perhaps representative of Hungary. In questions of compensation and change of profession Hungary has the same difficulties as does this country. I am grateful for the opportunity to take part in the meeting of this association and to compliment the members on their excellent work.

DR. FRANK C. KNOWLES, Philadelphia: To my mind, prevention is one of the most important portions of this entire subject. Protection of the skin and its condition are of tremendous importance. Now just for a moment I shall go back a good many years, to the war period, when I had the opportunity of serving as consultant in a large British hospital to which were admitted the first persons affected by mustard gas to come in from the line. The reason I want to bring this point forward is in regard to protection of the skin. The worst mustard gas burns were in the Scots, who, according to their tradition, insisted on going into the trenches in their kilts, and under their kilts wore no nether garments. The worst burns seen were, therefore, in the genital region rather than on the face. This brings to my mind an extremely important point, that the burns were worse in the areas of heat and moisture. One of the most important phases of the subject I consider is the necessity for complete physical examination of the persons working in industrial plants, particularly as to the condition of the skin. Is there an eruption? Is there oiliness, or is there extreme dryness? The physical type also should be considered. Is the subject blond or brunet? Is he

of more or less "glandular" type, high colored or rather pudgy? To reiterate, prevention and protection are of extreme importance.

DR. GEORGE M. MACKEE, New York: If I understood correctly, the sensitization to radiation is in the long ultraviolet and the short wavelengths of visible light—between 3,000 and 5,000 angstrom units (Å)—and not in the short wavelength field—around 2,000 Å. The radiation between 3,000 and 5,000 Å is penetrating and reaches the corium in large amounts. Rays of shorter wavelengths are not nearly so penetrating. Do Drs. Foerster and Schwartz believe that this makes any difference in sensitization to light and the production of tar melanosis?

DR. JOSEPH GRINDON, St. Louis: A dermatosis may result from contact not only with the essential materials used in an industry but with certain things only incidentally used. A baker had a follicular eruption on the extensor surface of the right forearm. Part of his work consisted in cleaning out a "kneading trough," in which the flour and other ingredients are placed. Cleaning was done with a composition with a petroleum oil base. He would pass his hand and arm into the trough and thus come in contact with the oil. This is an example of baker's dermatosis which had nothing to do with flour. It should be borne in mind also that often industrial dermatoses are caused not by the substances employed in the particular industry but in the process of washing and cleaning after work, which may either originate or aggravate the condition. Workmen use strong chemical soaps.

Just a word about the conduct of the witness in such cases: The members have been told that the three correct answers are "Yes," "No" and "I don't know," but another answer is sometimes helpful. A lawyer may attempt to confuse a witness who has stated that he does not believe that a causal relation existed between a dermatosis and a certain substance coming in contact with the skin. The lawyer seeks to have him admit that such a thing is possible. Perhaps an overconscientious man, with the thought that almost anything is possible, will say, "Yes, perhaps," and of course the lawyer will take advantage of that expression. I think that when the witness feels satisfied that no causal relation exists in the case, while the attorney seeks an answer based on generalities, the answer should bring the matter back from general principles to the actual case involved. In that situation the answer should be, "Not in this case."

DR. H. E. MILLER, San Francisco: I should like to discuss one point in Dr. Downing's paper. It is in regard to taking a second history a day or two after an assistant or some one else has taken the first one. It has been my experience that the first history should be the most thorough and the most complete. If the patient has any idea of giving false information he finds at the time of that first examination the type of answers that will help his case, and he will often give them to the physician at the time of the second taking of the history. I endeavor to get a complete and thorough history at the first examination and in most instances hold the patient to it.

DR. JOHN G. DOWNING, Boston: I am afraid I did not make myself clear..... .....unless the patient remains in the same room and has a few minutes to mull over what he said, and then I go in and take a better history, but he does not go home to consult with.....

DR. H. N. COLE, Cleveland: I want simply to mention a case of granuloma in connection with Dr. Miller's interesting paper, that of a shoemaker with tuberculoma of the tongue. All the members are acquainted with the custom of the

shoemaker of holding nails in his mouth. This man was put in the hospital for study and was found to have tuberculosis of one of his kidneys, and his urine was loaded with tubercle bacilli.

Dr. Harry R. Foerster, Milwaukee: The remarks about the patch test are pertinent because the wide use of the patch test in diagnosis, particularly by the industrial physician, has placed the dermatologist on the defensive, just as the allergist has put him on the defensive by the wide application of cutaneous and intracutaneous tests in diseases of the skin.

In reply to Dr. MacKee's question, I do not believe that the rays of long wavelength provoke the dermatitis resulting in melanosis. If the long wavelength of light that penetrates blue glass, for example, is of the same fluorescent spectrum as the photosensitizing substance in pitch, it will be absorbed by the pitch. This apparently results in the production and emission of short rays, and these rays, produced in the tissues where the photosensitizer is deposited, apparently provoke a local biochemical reaction resulting in inflammation and pigmentation. The light rays of long wavelength have the penetrating power to reach the photosensitizer, and it is possible to measure their wavelengths, but that gives no information on the secondary rays of emission thought to produce the pigmentation, which are presumably of short wavelength. Possibly they are similar to the short ultraviolet rays, because the latter produce pigmentation normally and the long wavelength ultraviolet and short wavelength visible rays, within which range the fluorescent spectrum apparently lies, cannot normally produce pigmentation.

Dr. Peck has stated that in the regeneration of melanoblasts following injury pigmentation is produced, and that irritation, such as injury or inflammation, is associated with and necessary for pigment production. In our test with pitch we observed pigmentation in some instances without any evidence of preceding inflammation; contrariwise, where the skin was intentionally abraded in the tests, no pigmentation was observed when light was excluded. In some workers pigmentation likewise developed apparently without inflammation.

Dr. Hans J. Schwartz, New York: In regard to the legal aspects of occupational dermatoses: The stories that have been told, I think, call for a story I heard in court when I was a witness in such a case. A woman claimed dermatitis as a result of having worn a dyed fur collar. She had worn it for about half an hour and never wore it again; shortly thereafter a dermatitis developed. Finally, after two years, the case came up for trial. She still had dermatitis and had had recurrent attacks off and on, though she did not wear that fur collar again. She brought various witnesses, including a pathologist, to testify that the dermatitis was due to the fur or whatever it was dyed with, and patch tests which they had performed were cited. Then the attorney for the defense asked the physician about the patch test. He said, "Doctor, in view of the fact that this woman has had recurrent attacks of dermatitis on different parts of her body since wearing that coat, can you state that if you had not made a patch test on that particular spot with the substance which you used that no dermatitis would have developed on that spot?" The doctor had to say, "No, I cannot. A dermatitis might have developed at the point at which the patch was applied, in view of the history." With that testimony the woman lost the case. I think that no dermatologist can say if a person has dermatitis, especially of the recurrent type, on different parts of the body that the dermatitis would not have developed at a tested site if the patch test had not been made.

Dr. J. Harper Blaisdell, Boston: In Boston at least it is somewhat fashionable to avoid court service if possible, largely because of a certain amount of impersonal abuse to which a physician is subjected on the stand. It should be noted that I said "impersonal abuse." I think that unless physicians are willing to take up this work, sooner or later it will be in other hands than those perhaps best fitted for it. If the testifying dermatologist or other physician will familiarize himself with some of the ordinary rules of the game, the rules of testimony, he will be in a much happier position on the stand. I was much interested in Dr. Grindon's suggestion as to that frequent question: "Is such a thing possible?" I think the answer that he gave is excellent. Another answer that I have used myself is, "Yes, it is possible in the sense that anything is possible."

ULCUS VULVAE ACUTUM (LIPSCHÜTZ), ASSOCIATED WITH TYPHOID FEVER

CHAIM BERLIN, M.D.
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Clinical and bacteriologic observations of the last decade have helped considerably to determine the nature of acute vulval ulcer. Lipschütz [1] considered this disease a local involvement of the pudenda arising from autoinfection. However, in an increasing number of cases of acute vulval ulcer there is a generalized rash, usually in the form of erythema multiforme or erythema nodosum. Cases of oral lesions resembling aphthae are particularly numerous. The isolation of Bacillus crassus from the blood (in the case herein reported blood culture was negative), the presence of this pathogenic organism in the metastatic cutaneous lesions (Samek and Fischer [2]) and finally its frequent occurrence in oral lesions (first shown by Ito [3] and afterward by Matras,[4] Philadelphy,[5] Talalov,[6] Nishimura,[7] Fuhs-Graz [8] and in the present case) all prove that the disease is generalized, with a tendency for the exciting agent to invade the blood stream and cause metastasis. It is, however, not clear under what conditions the saprophyte which often harmlessly inhabits the genital tract as Döderlein's bacillus assumes pathogenic powers and appears as B. crassus, the causative agent of the disease. Are special circumstances necessary for this to happen, such as concurrent illness? I would point out too the frequent occurrence of ulcus vulvae acutum with enteric fever. In Lipschütz [9] second case the ulcer was associated with typhoid, as it was

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1. Lipschütz, B.: Ulcus Vulvae Acutum (Lipschütz), in Jadassohn, J.: Handbuch der Haut- und Geschlechtskrankheiten, Berlin, Julius Springer, 1927, vol. 21, p. 392.

2. Samek, J., and Fischer, E.: Arch. f. Dermat. u. Syph. **158**:729, 1929.

3. Ito: Zentralbl. f. Haut- u. Geschlechtskr. **39**:856, 1932.

4. Matras, A.: Arch. f. Dermat. u. Syph. **166**:491, 1932.

5. Philadelphy, A.: Dermat. Wchnschr. **97**:1556, 1933.

6. Talalov, I.: Ulcus Vulvae Acutum Accompanied by Disease of the Skin and of the Oral Mucosa, Arch. Dermat. & Syph. **30**:510 (Oct.) 1934.

7. Nishimura, M.: A Case of Ulcus Vulvae Acutum with Aphthae-like Lesions in the Mucous Membranes of the Mouth Associated with Acute Iritis, abstracted, Arch. Dermat. & Syph. **34**:900 (Nov.) 1936.

8. Fuhs-Graz: Dermat. Wchnschr. **105**:1073, 1937.

9. Lipschütz, B.: Arch. f. Dermat. u. Syph. **114**:363, 1913

in Scherber's case,[9a] 2 cases of Rosenthal,[10] 2 of Assnin and Sutejew,[11] 1 of Troisier and his co-workers [12] and 1 of Brulé and his co-workers.[13] To these I wish to add the following case:

REPORT OF A CASE

Z. B., a Jewess aged 12 years, complained of genital sores which had appeared the previous day; she had fallen ill a week before, with high fever. I found the whole left labium minus to be red and swollen and in the middle of it an oval ulcer, 15 by 9 mm.; this ulcer was raised a few millimeters above the general surface of the skin, and its floor, covered by a purulent film, was necrotic in places. A little lower down, by the side of the fossa navicularis, there was a bluish red and hemorrhagic hard papule about the size of a lentil. A similar but larger papule was present on the inner aspect of the right labium minus, opposite the ulcer. The sores were painful and more so on handling; a purulent secretion from the vagina bathed the whole vulva. The hymen was intact, and the inguinal glands were not enlarged. The general appearance of the ulcer was that of ulcus vulvae acutum, gangrenous type. A smear made from material from the lesions by Dr. Rena Junowitz showed B. crassus in great quantity.

The high temperature, which had persisted for six days before the ulcer appeared, raised a suspicion of enteric fever; so the patient was removed on the morrow (Feb. 1, 1938) to the children's department of the hospital, (Prof. L. F. Meyer's service).

Examination on admission showed the girl to be well developed and well nourished; the menses had not yet commenced. The mouth, throat, lungs and heart were healthy; the cervical glands were enlarged; the abdomen was soft; the spleen was not enlarged, and there were no cutaneous changes. The temperature was 101 F. and the pulse full and rapid. In other words, there were no clinical signs of typhoid. The condition of the genitalia had changed considerably since the previous day. The redness and swelling of the vulva had completely subsided. The small papule was no longer seen; it had ulcerated and fused with the large ulcer above it, making one ulcer 22 mm. long. This ulcer had sharp, prominent edges undermined in places, and its base, studded with necrotic spots, exuded blood-stained pus. The papule on the other (right) side had also ulcerated; so there were present two typical ulcers, one opposite the other. Gonococci and diphtheria organisms were absent; B. crassus was found both in smears and in culture. A blood count showed 65 per cent hemoglobin, 3,850,000 red blood cells, and 7,200 white blood cells. The next day rigor occurred, and the temperature rose to 104.5 F. The ulcers were painful, causing severe dysuria and preventing sleep. Local treatment consisted of douching with potassium permanganate solution, dusting with bismuth tribromphenate powder and, when necessary, anointing with 10 per cent ethyl aminobenzoate ointment.

9a. Scherber, cited by Rosenthal.[10]

10. Rosenthal, S.: Arch. f. Dermat. u. Syph. **162**:95, 1930.

11. Assnin, D., and Sutejew, G.: Zentralbl. f. Haut- u. Geschlechtskr. **48**:270, 1934.

12. Troisier, J.; Bariéty, M., and Gabriel, P.: Zentralbl. f. Haut- u. Geschlechtskr. **50**:396, 1935.

13. Brulé, Hillemand and Gilbrin, cited by Roederer and Lanzenberg, in Darier and others: Nouvelle pratique dermatologique, Paris, Masson & Cie, 1936, vol. 4, p. 224.

The Widal test gave a positive result with serum diluted up to 1:100, and Bacillus typhosus (Eberth) was cultured from the blood. Four days later there appeared in the mouth, on the inner aspect of the lower lip, an aphtha the size of a pea, without any halo of erythema, and close by it two erosions about the size of a pinhead. A swab of material from these oral lesions showed B. crassus. The ulcers gradually healed, but B. crassus was found in them for two weeks. The patient left the hospital after four weeks; a final examination a month later showed small scars where the ulcers had been.

COMMENT

This is the ninth case on record of ulcus vulvae acutum associated with enteric fever. It seems to me important to stress this frequent coincidence of ulcus vulvae acutum—itself a rare disease—with typhoid fever and to note that it occurs on most occasions at the beginning of the fever. For this reason it is necessary in every case of ulcus vulvae acutum, and especially with the gangrenous type with high temperature and systemic disturbance, to think of the possibility of concurrent typhoid fever.

SUMMARY

A case of the association of ulcus vulvae acutum with enteric fever is reported. This association seems to be not uncommon.

ARE THERE PARADOXIC SEROLOGIC REACTIONS IN SYPHILIS?

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The serology of syphilis during late years has reached a high degree of perfection. The number of syphilitic persons being detected by means of tests of the blood and spinal fluid is larger today than ever before. Yet, there are instances in which one may encounter frank syphilis and a negative serologic reaction. Indeed, a test which is sensitive enough to detect latent syphilis without symptoms may give a negative reaction in the face of a definite clinical picture of syphilis.

Then, again, there are the fluctuating serologic reactions following therapy, so annoying to the clinician. A serologic test at a given time after therapy might give negative results, leading the clinician to believe that the therapy is having definite effect on the serologic picture, but a subsequent examination might reveal a positive reaction. On the other hand, the reaction may be positive some time after therapy and become negative at a later date, although no further treatment is administered.

Studies of tissue reactions in immunity in relation to antibody reactions carried out in my laboratory [1] during the past decade have thrown light on many serologic manifestations that are met in a number of infectious diseases. In this article I shall concern myself particularly with those situations in syphilis in which negative serologic reactions may be obtained. I shall attempt to show that these reactions are not paradoxic but are based on experimentally established immunologic principles. I shall also consider fluctuating and other apparently paradoxic reactions and reactions for which there is no explanation at present, namely, false positive reactions.

SITUATIONS IN SYPHILIS IN WHICH NEGATIVE SEROLOGIC REACTIONS MAY BE OBTAINED

Before considering negative serologic reactions in the presence of syphilis it is well to bring to mind the basis for antibody production in syphilis. It is now generally assumed that a conjugated protein-lipid

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1. Kahn, R. L.: Tissue Immunity, Springfield, Ill., Charles C. Thomas, Publisher, 1936.

antigen is in all probability responsible for the production of precipitin and complement-fixing antibodies in syphilis. The protein fraction is probably furnished by the spirochetes and the lipid fraction by broken-down body tissue of the host. The experimental basis for the assumption that a protein-lipid antigen is the stimulus for antibody production lies in the following observation made by Sachs, Landsteiner [2] and others. When lipids extracted from normal tissue are injected into animals, little or no antibody production is obtained. When, however, tissue lipids are first mixed with protein and the mixture then injected into animals, production of antibodies to the lipids becomes demonstrable in the test tube. It is generally accepted that antibody production in syphilis is governed by the same immunologic factors which govern antibody production in other infectious diseases.

Let me now consider those situations in syphilis in which the serologic reaction may be negative:

1. *During the Period of Incubation.*—Little need be said regarding negative serologic reactions during the period of incubation in syphilis. Antibody reactions are usually negative in all infections during the period of incubation. In syphilis, however, the period of incubation is approximately a month—a period generally more than ample for antibody production following inoculation with micro-organisms or other antigens. It may be, therefore, that in isolated instances, serologic tests would prove positive during the latter part of the period of incubation in syphilis. I know, indeed, of an instance in which a positive Kahn reaction was reported four days previous to the appearance of the chancre. However, the dearth of serologic studies during the period of incubation necessarily renders speculative any discussion of serologic results during this period.

2. *During the Primary Stage.*—It is generally assumed that the serologic reactions are usually negative in early primary syphilis because there has not yet been time for development of sufficient immunity for the production of antibodies. Yet, when animals are inoculated with bacterial or protein antigens, a month, as indicated, is usually a long enough period for the development of sufficient immunity for antibody production. Indeed, ten days to two weeks after the inoculation of an antigenic agent is often ample time for the calling forth of antibodies.

Furthermore, my studies [3] suggested that the immunologic mechanism underlying the formation of a primary lesion in syphilis is a manifestation of some immunity on the part of the host and not of the lack of immunity. In my experiments with rabbits, in which I employed

2. Landsteiner, K.: The Specificity of Serological Reactions, Springfield, Ill., Charles C. Thomas, Publisher, 1936, p. 64.

3. Kahn,[1] p. 284.

protein antigens, I was able to produce spontaneous ulcerative lesions in the skin simulating the primary lesions of syphilis in man only when the animals possessed a given degree of immunity.

In my opinion, the negative serologic reactions in early primary syphilis may not be due to the lack of production of antibodies but to their removal from the blood stream by circulating spirochetal antigen, just as the negative agglutination reactions in the first week of typhoid fever may not be due to lack of production of agglutinins but to their removal from the blood stream by circulating typhoid antigen. As is well known, when a sufficiently large quantity of antigen circulates in the blood stream in the presence of circulating antibodies, the latter substances are likely to disappear from the blood stream, owing in all probability to antigen-antibody union in vivo.

The type of serologic reaction which one may obtain in primary syphilis, therefore, is in all probability dependent on the quantity of antigenic spirochetal material present in the blood stream. When this quantity is large enough to combine with all the antibodies present, the serologic reaction is negative. As the quantity of spirochetal antigen is decreased with the development of immunity, larger numbers of antibodies circulate in the blood stream and the serologic reaction becomes positive.

I believe that a negative serologic reaction during the late primary stage of syphilis implies defensive mechanisms of but a low grade. Such a reaction must mean that the units of spirochetal antigen are still in excess of the antibody units and that the body has not yet succeeded in reducing the number of spirochetes in the blood stream. On the other hand, a positive serologic reaction during the early primary stage must mean that defensive mechanisms antagonistic to the spirochetes have already developed; that the body has been able to reduce the number of organisms to such a degree that the antibody units in the blood stream exceed the units of spirochetal antigen. With the increase in humoral immunity as the primary period progresses, one begins to note evidence of tissue immunity, indicated by the fact that an ulcer teeming with spirochetes undergoes spontaneous healing.

Why are serologic reactions almost always positive during the secondary stage? The answer to this question may be found in studies on the role of the skin in immunity. I [4] have shown that an outstanding feature of the response of the tissues in immunity is the fact that the skin possesses a far greater attractive force for the specific antigen than do other tissues. In the case of rabbits immunized with protein antigens it was found that the skin possesses a localizing power for the antigen from 10 to 15 times greater than that possessed by some other

4. Kahn,[1] p. 180.

tissues, such as skeletal muscle. In all probability, this high localizing power for antigen is also possessed by surface mucous membranes. I believe that the attractive force of the cutaneous tissue for circulating antigen plays an important role in the formation of cutaneous rashes noted in infection and immunity. During the secondary stage of syphilis this attractive force should cause some spirochetes and spirochetal antigen to be withdrawn from the blood stream—a step which would result in an increase in the antibody titer and in positive serologic reactions.

3. *In Precocious Malignant Syphilis.*—Rarely syphilis literally overwhelms the host, as in precocious malignant syphilis. Wile [5] observed occasional cases of this type of syphilis in which the serologic reactions were negative. This finding is what one might expect. Antibody production is interfered with when a host is overwhelmed with antigen. An animal—a rabbit, for example—will show a far higher antibody titer when a small amount of horse serum is injected than when an excessive amount is injected.

4. *When Syphilitic Destruction of Tissue Had Occurred Sometime Previously.*—It is possible to have negative serologic reactions in the presence of old syphilitic lesions. To illustrate: A patient has an aneurysm of syphilitic origin. The processes which led to the formation of the aneurysm may be arbitrarily divided into two steps: (1) an attack of syphilitic aortitis, during which the elastic tissue within the inflammatory area of the aortic wall was destroyed and replaced by fibrous tissue, and (2) the slow and steady expansion of the fibrous area into a tumor-like mass.

It is clear that while the spirochetes were active during the first step of aneurysm formation, they were not necessarily active during the second step. Inactivity, in turn, means little or no liberation of spirochetal antigen and, hence, little or no stimulus to antibody production. The same statement applies to a perforated nasal septum and to other old destructive processes of syphilitic origin. While antibodies may circulate for a given time after spirochetal quiescence, they will gradually disappear from the blood stream. The end results of spirochetal destruction, however, are bound to remain after the antibodies have disappeared, just as the ruins resulting from a fire remain after all signs of heat and smoke have disappeared.

5. *During Marked Syphilitic Flare-ups.*—In a syphilitic flare-up large quantities of spirochetal antigen are thrown into the circulation. This generally tends to stimulate antibody production, but it may also lead to antigen-antibody union in vivo. When, therefore, the amount of antigen in the circulation is large enough to combine with all the antibody units, negative serologic reactions are to be expected.

5. Wile, U. J.: Personal communication to the author.

6. *During Therapy.*—Negative serologic reactions during therapy will be discussed more fully later. At present I desire merely to bring to mind that a given therapeutic injection, on the one hand, and prolonged intensive therapy, on the other, do not necessarily exert the same effects on antibody production. A single injection may help to inactivate spirochetal foci and thus reduce the stimulus for antibody production; it may in some cases activate spirochetal foci and thereby stimulate antibody production, or in isolated instances it may provoke so marked a syphilitic flare-up as to cause the throwing into the circulation of an excess of spirochetal antigen sufficient to combine with any antibodies that may be present.

Significance of Negative Serologic Reactions in the Presence of Syphilis.—Negative serologic reactions in special instances in syphilis do not invalidate tests for syphilis any more than negative agglutination reactions in the early stage of typhoid fever invalidate the Widal test or negative tuberculin reactions in miliary tuberculosis the tuberculin test. Syphilis manifests itself in many different forms, and it is to be expected that in certain situations little syphilitic antigen—so little as to be insufficient for the stimulation of antibody production—will be liberated, while in other situations excessive amounts of syphilitic antigen—sufficient to retard antibody formation or to combine with any antibodies already formed—will be liberated. Happily, negative serologic reactions in the presence of syphilis are usually temporary; the reactions generally become positive either spontaneously or during therapy. These negative reactions emphasize the fact that the diagnosis of syphilis cannot be based on a blood test alone. The clinician must continue to assume responsibility for the diagnosis by correlating the clinical findings and the history with the serologic results.

FLUCTUATING SEROLOGIC REACTIONS

1. *Daily Fluctuations in the Absence of Therapy.*—In 1914 Craig [6] reported daily variations in the results of Wassermann tests in untreated syphilitic patients who were confined at the United States Military Prison at Fort Leavenworth, Kan.; he found instances in which the serum was positive on one day and negative on the next. Greenbaum and Yagle [7] studied the daily serologic reactions in 50 cases of untreated syphilis by the Kolmer-Wassermann and the Kahn test. Out of this number, there were variations in the Kolmer test in 7 and in the Kahn test in 6 cases.

6. Craig, C. F.: Variations in the Strength of the Wassermann Reaction in Untreated Syphilitic Infections, J. A. M. A. **62**:1232 (April 18) 1914.

7. Greenbaum, S. S., and Yagle, E.: Daily Variations in Complement Fixation (Kolmer) and Precipitation (Kahn) Reactions in Untreated Syphilitic Patients, J. A. M. A. **87**:318 (July 31) 1926.

An outstanding feature of the variations in the last study is that in no instance did the Kahn reaction vary from 4 plus to minus, and in only 1 instance did the Kolmer reaction show this type of variation. In practically all instances the variations ranged from 2 plus to 1 plus or to minus. Variations are more likely with a complement fixation test than with a precipitation test, owing to the employment of relatively unstable hemolytic reagents in methods of the former type. However, variations in results may occur with any method whenever the quantity of antibody in the blood stream is relatively small.

At the University Hospital the staff of the serologic laboratory is constantly alert for variations in results of the Kahn test. The test is made as part of the registration procedure for every patient admitted. If the reaction is positive the patient is referred to the department of dermatology and syphilology, where a specimen of blood for a serologic test is taken as a routine. It occasionally happens that the serologic laboratory will perform three Kahn tests on 1 patient within two or three days. One specimen of blood is drawn during registration, another in the clinic in which the patient is seeking medical attention and a third in the dermatologic clinic. Yet, out of a total of approximately 30,000 examinations made annually, in only 1 or 2 instances are there variations in the Kahn reaction from positive to negative, and vice versa.

It must not be assumed that a positive serologic reaction represents the height of serologic potency. Actually, of 2 specimens of serum giving positive serologic reactions when examined by means of the quantitative Kahn procedure,[8] 1 may show only 4 units (or pluses) and the other 1,000 units. Thus, there are tremendous differences in the potency of serum giving positive reactions, and it is not the highly potent serum that will show variations but the serum which just approaches the positive level. Briefly, when a patient gives a positive reaction to a dependable serologic test on one day and a negative reaction soon after, it must mean that the patient has but a small quantity of antibody in his blood stream.

2. *Prolonged Fluctuations in the Absence of Therapy.*—Such fluctuations are generally not considered paradoxic by physicians. Serologic variations, as indicated, depend on changes in the quantity of antibody in the blood stream, and these changes in turn depend on the quantity of spirochetal antigen available for the stimulation of antibody production. Since spirochetal activity is a variable factor, antibody production must necessarily be a variable factor.

3. *Daily Fluctuations in the Presence of Therapy.*—Fluctuations in serologic results following therapy are especially disturbing. The

8. Kahn, R. L.: The Kahn Test—A Practical Guide, Baltimore, Williams & Wilkins Company, 1928, p. 132.

physician who administers therapy is naturally concerned with changing the serologic reaction from positive to negative. If, therefore, after he receives a negative serologic report a subsequent examination gives him a positive report again, he is likely to consider that the serologic method is in error. Actually, his therapy may not have been sufficient to reduce the serologic response to a completely negative but only to a borderline level. Hence, the serologic results are likely to be fluctuating.

It might indeed be desirable to divide arbitrarily the changes in serologic reactions following therapy into three stages: the persistently positive stage, the fluctuating stage and the persistently negative stage. Fluctuating reactions are not limited to syphilis. For example, in an examination for typhoid agglutinins one does not find fluctuations in results from a high titer to a negative reaction, but when the titer reaches a low level fluctuations begin to become evident.

4. *Prolonged Fluctuations in the Presence of Therapy.*—Occasionally a serologic reaction may be positive after intensive therapy, only to become negative some months later, in the absence of further therapy.[9] This situation may be accounted for by the tendency of antibodies to continue to circulate in the blood stream for a given time after the antigenic stimulus for antibody production has been removed. The length of time during which antibodies will remain in the blood stream after their production has ceased depends on many factors, such as the type and quantity of the antigen and the kind of animal called on to produce the antibodies. A single injection of a moderate dose of a protein antigen into a rabbit, for example, will call forth circulating antibodies in about ten days, and these will generally disappear from the circulation by the end of about two weeks. Repeated injections of antigen at given intervals will tend to prolong the presence of circulating antibodies. Generally, however, in about a month or more after the last injection of the antigen, the antibodies will begin to disappear from the circulation.

In syphilis, if it is assumed that after intensive therapy in a given case the last of the spirochetes has been killed, there still remain the antigenic constituents of these organisms which are capable of stimulating antibody production. When these constituents have been broken down, antibody production should cease. However, there are available no experimental data as to when antibody production ceases after the destruction of syphilitic antigen or antigens. Neither are there available data as to the length of time antibodies will circulate in the blood after the destruction of syphilitic antigen.

The indications are that after the removal of the antigenic stimulus antibodies in syphilis will continue to circulate in the blood stream for

9. Chargin, L., and Rosenthal, T.: The Paradoxical Behavior of the Wassermann Test in Latent Syphilis, J. A. M. A. **107**:1374 (Oct. 24) 1936.

anywhere from a few days to several months. Hence, it is possible for an intensively treated patient to give a positive serologic reaction several weeks after the administration of the last course of therapy and to return some months later with a negative reaction. In cases in which a syphilitic focus is present, the reverse of the above condition might be true. In a case in which the reaction is negative soon after therapy it may become positive several months later. Presumably the therapy was sufficiently intensive to halt spirochetal activity, but as months passed in the absence of therapy, an awakening of spirochetal activity may have taken place, with renewed stimulation of antibody production. The patient thus returns with a positive serologic reaction.

5. *Variations in Serologic Results Shown by Different Methods.*—Occasionally a given specimen of serum will give a positive reaction to a precipitation test and a negative reaction to a complement fixation test, or vice versa. This fact does not mean that a precipitation test detects an antibody different from that detected by complement fixation, for it is generally accepted that tests of both kinds detect the same type of antibody. The variations in results are generally due to differences in sensitivity of the two tests. Two complement fixation tests of different sensitivity would be likely to give similarly variable results and the same statement applies to two precipitation tests.

6. *Serologic Changes as a Result of Aging of Serum.*—Most specimens of syphilitic serum will show little change in serologic potency if kept for several days in the ice box. Rarely serum will give a positive reaction on one day and a doubtful or negative reaction after it has stood in the ice box overnight, although the same serologic test is employed. When the antibody content of serum of this kind is studied by the quantitative Kahn procedure, it will usually be found merely to approach a positive level. Such serologic fluctuations in the same serum may be met during therapy when the antibody content is on the borderline. When met in the absence of therapy (in the absence of clinical evidence),I am inclined to believe that the reaction is nonspecific. It should be added that under conditions of prolonged aging syphilitic serum tends to weaken in serologic potency.[10] This statement holds true for practically all antibacterial serums.

DIFFERENCES IN SEROLOGIC RESPONSE FOLLOWING THERAPY IN EARLY AND LATE SYPHILIS

1. *Persistently Negative Reactions Following Therapy in Early Syphilis.*—As is well known, if treatment is begun in early syphilis, the serologic reactions may become negative in less than a year, although the patient is far from cured by that time. These apparently paradoxic

10. Kahn, R. L.: Serum Diagnosis of Syphilis by Precipitation, Baltimore, Williams & Wilkins Company, 1925, p. 86.

negative reactions may be due to the immunologic relation existing between the tissues and the spirochetes in early syphilis. The spirochetes are at that time widespread in the tissues, which permits the drug to reach them readily. The parasite is either destroyed with relative rapidity or rendered inactive. In either case, when no spirochetal antigen is liberated the stimulus for antibody production ceases and the serologic reactions become negative. From a clinical standpoint, however, since inactive spirochetes may become active again in the course of time, therapy must be continued in spite of the negative serologic reactions.

2. *Persistently Positive Reactions Following Therapy in Late Syphilis.*—In contradistinction to the rapidity with which the serologic reactions become negative after therapy in early syphilis, positive reactions tend to persist after therapy in late syphilis. Years of contact between the tissues and the spirochetes enable the tissues to build up marked localizing capacities for the spirochetes, on the one hand, and permit the parasite to build up marked resistance, on the other.

Several immunologic factors come to mind in the consideration of serum-fast reactions in the presence of prolonged and intensive therapy. 1. An immune host in whom the capability to produce antibodies to a given antigen has developed requires only minute traces of the antigen for continued production of such antibodies. If, for example, a rabbit previously immunized to horse serum and having lost its serum precipitins is given an injection of as little as 0.000001 cc. of horse serum, precipitins will reappear in the circulation. 2. Immunity to a microorganism means immunity to the antigenic constituents of the microorganism. Hence, it is possible that in certain instances the stimulus for antibody production is not the result of spirochetal activity but of antigenic constituents of dead spirochetes. 3. It is also conceivable that when the stimulus for antibody production is kept active for many years the tissues in certain cases may continue to produce antibodies nonspecifically.

From a practical point of view it is well to recall that in the treatment of serum-fast patients Wile and Hasley [11] pointed out nearly a score of years ago the inherent danger of aiming at "serologic cure." I believe that the majority of syphilologists agree that, in spite of a persistently positive serologic reaction, the clinical condition of the patient should be the guide to therapy.

POSITIVE SEROLOGIC REACTIONS IN THE ABSENCE OF SYPHILIS

1. *In Lower Animals.*—Of interest is the fact that the same type of serologic reactions that are obtained in man in syphilis are often obtained

11. Wile, U. J., and Hasley, C. K.: Serologic Cure (?) in the Light of Increasingly Sensitive Wassermann Tests, J. A. M. A. **72**:1526 (May 24) 1919.

in lower animals in the absence of syphilis. It does not matter what particular method one employs, whether a complement fixation or a precipitation test, the reactions with the serum of rabbits, dogs, cows, horses, pigs, chickens and other animals are positive in most instances.[12] One can only speculate as to the reason for the universality of this reaction among animals. It is conceivable that the basis for these serologic reactions is the likelihood that the animals are carriers of nonpathogenic spirochetes. Man, for example, is known to give low titer agglutinin reactions to typhoid bacilli without regard to typhoid infection or artificial immunization. The explanation is that colon and typhoid bacilli possess certain antigenic constituents in common, and man, being a carrier of colon bacilli, possesses some natural antibodies against typhoid bacilli. On the same basis, it might be assumed that lower animals possess natural antibodies against spirochetes.

Attempts are being made in my laboratory to differentiate the type of reaction noted with the serum of animals, particularly with rabbit and with horse serum, from that given by human syphilitic serum. Our results thus far have been negative. The reactions of the animal serum seem to be influenced by the same factors which influence those of human serum. The outstanding differential characteristic appears to be that the reactions with the animal serum are relatively weak. While in many cases serum will approach a definitely positive reacting level, it usually will give a negative reaction in low dilutions with saline solution.

2. *In Man.*—Of special importance is the fact that man will, in certain conditions, give positive serologic reactions in the absence of syphilis. These conditions have long been recognized. They include leprosy and malaria, infectious mononucleosis and other febrile diseases, cancer and jaundice. Indeed, any nonsyphilitic pathologic condition may, in isolated instances, be responsible for positive serologic reactions. With the exception of leprosy, these positive reactions are generally temporary. However, I know of 1 patient with infectious mononucleosis who continued to give positive serologic reactions for close to three months after the subsidence of the infection.

Rarely apparently normal persons will give positive reactions in the absence of syphilis. Several years ago, in this laboratory, a reaction of this type was discovered in a medical student, apparently free from syphilis, who wished to be a blood donor. His serum was studied at frequent intervals by the Kahn test, with the following results: 1. The

12. Kolmer, J. A., and Trist, M. E.: Studies in Non-Specific Complement Fixation: I. Non-Specific Complement Fixation by Normal Rabbit Serum, J. Infect. Dis. **18**:20 and 27 (Jan.) 1916. Parro, T. J.: The Kahn Reaction with Serum of Different Animals, ibid. **53**:210 (Sept.-Oct.) 1933.

precipitation reactions fluctuated from minus to 4 plus, being close to 2 plus in most instances. 2. The reactions generally appeared atypical, although now and then they appeared sufficiently typical to justify positive reports. 3. The precipitates formed were apparently not as stable as those obtained with syphilitic serum, showing a tendency to disperse on standing. 4. After dilution of the serum with an equal amount of physiologic solution of sodium chloride a negative reaction would be obtained, indicating a low antibody titer. Based on these serologic findings, I was obviously unable to submit a definitely positive Kahn report for this patient.

Some physicians believe that positive serologic reactions in the absence of syphilis are related to the presence of heterophile antibodies in the blood stream. In infectious mononucleosis, for example, there generally exists some parallelism between the positive serologic reaction and the antibody titer against sheep cells. The extent to which such parallelism between heterophile antibody and positive serologic reaction exists in other pathologic conditions or under normal conditions has not been established.

Considering how widespread is the serologic reaction in syphilis throughout the animal kingdom, it is understandable why doubtful reactions are occasionally encountered in nonsyphilitic persons. The serum of these persons evidently contains traces of this relatively common antibody. Indeed, it may be said that the difference between the serum of syphilitic and of nonsyphilitic persons is quantitative rather than qualitative—that serum of the former type contains relative excess of an antibody which is generally found in traces in nonsyphilitic serum. Precipitation studies carried out in my laboratory by means of the ultramicroscope [13] showed that both syphilitic and nonsyphilitic serum possess the property of precipitation when properly mixed with a suspension of tissue extract antigen. However, syphilitic serum possesses this property to a marked and nonsyphilitic serum to a slight degree.

With a dependable test for syphilis, serum containing minute amounts of antibody gives reactions that are either negative or so close to the negative level that they are reported as such. If the sensitivity of a test is increased beyond proper limits, traces of antibody may be sufficient to give definitely positive reactions. Hence, highly sensitive methods are likely to give comparatively large numbers of false positive reactions.

This relation between sensitivity and specificity is illustrated by examining the results of the evaluation of tests for syphilis carried out by the United States Public Health Service in cooperation with the American

13. Malloy, A. M., and Kahn, R. L.: The Ultramicroscopic Precipitation Reaction in Syphilis, J. Infect. Dis. **48**:243 (March) 1931.

Society of Clinical Pathologists in 1935.[14] Thirteen different tests or modifications were subjected to a comparative study in specificity and sensitivity. When the results shown by twelve of the methods are compared with those shown by the standard Kahn test, it is found that the average incidence of false positive reactions given by six tests that proved less sensitive than the standard Kahn test was 0.8 per cent, while the average incidence of false positive reactions given by six tests more sensitive than the standard Kahn test was 2 per cent.

SEROLOGIC REACTIONS WHICH MAY OR MAY NOT CORRESPOND TO CLINICAL FINDINGS: THE SEROLOGIC TEST EMPLOYED

Obviously, the types of serologic reactions discussed in this paper represent but a small fraction of the vast number of reactions which correspond to clinical expectation. Among 1,000 hypothetic tests for syphilis made by a reliable method in an average population, there may be 945 negative and 50 positive reactions, with clinical concurrence. Only the remaining 5 reactions might require further study. It is this small group, representing 0.5 per cent, with which this article is concerned.

I believe that the number of "difficult" reactions given by the standard Kahn test in the serologic laboratory of the University Hospital is considerably less than 0.5 per cent, although most of the examinations are made of patients presenting pathologic conditions. This belief is substantiated by the recently published report of Nagle and Willett,[15] dealing with an analysis of the results of five official evaluations of tests for syphilis. According to this report, the standard Kahn test gave 0.06 per cent nonspecific reactions, while the percentage of such reactions given by the other tests ranged from 0.7 to 1.4. It is thus evident that the Kahn test may give only 1 false positive reaction in about 1,500 cases. Hence, the figure suggested, 0.5 per cent (the number of serologic reactions which might require further study), is nearly 10 times as great as the percentage of false positive reactions given by the Kahn test in the five evaluations. In my opinion, the evaluations of tests for syphilis conducted yearly by the United States Public Health Service are rendering immeasurable service in raising the level of the serologic diagnosis of syphilis. It should be emphasized that in the discussion of paradoxic serologic reactions in this article I am assuming a priori that a highly reliable test has been employed.

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14. Cumming, H. S.; Hazen, H. H.; Sanford, A. H.; Senear, F. E.; Simpson, W. M., and Vonderlehr, R. A: The Evaluation of Serodiagnostic Tests for Syphilis in the United States, J A. M. A. **104**:2083 (June 8) 1935.

15. Nagle, N., and Willett, J. C.: What Did Five Official Evaluation Studies of Tests for Syphilis Reveal? Am. J. Syph., Gonor. & Ven. Dis. **22**:231 (March) 1938.

SUMMARY

Serologic reactions in syphilis which appear paradoxic have been discussed. Consideration has been given to negative serologic reactions in the presence of syphilis, to fluctuating serologic reactions and to differences in serologic response following therapy in early and in late syphilis—based on principles governing antigen-antibody reactions in immunity and infection. Positive reactions in the absence of syphilis have also been considered. It is recognized that in the great majority of cases the serologic reactions concur with the clinical picture. Yet it seemed timely to consider those unexpected reactions, in view of the increasing use of serologic tests in connection with programs for the eradication of syphilis.

ABSTRACT OF DISCUSSION

DR. F. G. NOVY JR., Oakland, Calif.: With the present campaign against syphilis there has been a great increase in the number of serologic tests performed. It is important to emphasize the fact that these tests are not infallible. Recently a number of studies have evaluated the different serodiagnostic tests, but there has been lack of discussion on their paradoxic behavior.

In his paper Dr. Kahn assumes that these unusual reactions are not due to laboratory error. Practically and from a clinical standpoint differentiation between a paradoxic reaction and a laboratory error is just about impossible. It is here that the clinician needs to evaluate his findings and use the serologic test only as an aid.

Dr. Kahn states that hypothetically 0.5 per cent of serologic reactions in an average group of subjects would need further study. This percentage may seem small, but the question whether a certain manifestation is due to syphilis or to some other cause is constantly confronting the practitioner.

It is regrettable that there is a tendency to take the serologic reaction as the final word in making the diagnosis of syphilis. Granted that the serologic test is probably the most important single aid to diagnosis, yet it is just an aid as are other methods and means of diagnosis. The history and the clinical findings should play a most important part.

The question of fluctuations in the reaction, from a clinical standpoint, should not play too important a part in the treatment of the patient. The example that Dr. Kahn cites, of a physician who wanted to know why there was a 2 plus reaction with an aneurysm when there should have been a 4 plus, is certainly beside the point. The important point is whether the patient has an aneurysm due to syphilis. This is a clinical question that the physician and not the laboratory should decide.

The problem of positive serologic reactions in the absence of syphilis is one that is constantly present. All the members have had cases in which a positive serologic reaction is surprising, and a second laboratory may send back a negative report, and a third, a 2 or 3 plus report. Follow-up of these cases shows that this reaction is not due to syphilis, as there is no clinical evidence and the reactions continue to be at variance with one another. This sequence was well brought forth in the recent study on this question in which serologic studies were made of patients with diseases other than syphilis (Hazen, H. H.; Parran, T.; Sanford, A. H.; Senear, F. E.; Simpson, W. M., and Vonderlehr, R. A.: Occurrence in

Leprosy of Positive Serodiagnostic Tests for Syphilis, *Ven. Dis. Inform.* **17**:253 [Sept.] 1936). The tests were carried on for the most part by serologists using their own tests, and there was a rather appallingly high incidence of false reactions: 50 per cent in leprosy, which, granted, is a rare disease; over 10 per cent in malaria and well over 2 per cent in some of the febrile diseases.

DR. PAUL A. O'LEARY, Rochester, Minn.: My discussion will be limited to the paradoxic or falsely positive serologic reports encountered in cases in which clinical signs, symptoms or history of the disease are not to be found. I have in mind as a concrete example the case that was illustrated in the lantern slides which I showed, namely, that of a virtuous girl less than 20 years of age, with no stigmas of congenital syphilis and no clinical manifestations or suspicion of acquired syphilis, whose parents also showed no clinical or serologic sign of syphilis. In 1 such case observed over five years by Dr. F. E. Senear and me a series of conflicting reports were obtained, varying from completely negative to strongly positive. Twelve different laboratories, including those of the originators of some of the flocculation technics, examined the blood, and the reports varied from negative to strongly positive. Five serologists examined the same sample of blood with conflicting results and their individual reports varied from day to day.

Such serologic variations are not limited to virtuous young women, but are encountered in patients of both sexes and in all age groups. However, these young women present a problem that is difficult to solve.

It is my belief that variations in serologic reports such as I have mentioned are not uncommon and that clinicians are encountering these problems frequently —in fact, too often, since the serologists have increased the sensitivity of the flocculation tests. In their effort to provide a test that will give positive reports in a higher percentage of cases of syphilis, it appears that they have met with success at the expense of the specificity of the tests. The evidence in the 3 cases I presented would indicate that the so-called normal variation in the patient's serum could not explain the marked discrepancies in the reports obtained on the same specimen of blood by different serologists but would indicate that the fault is with the serologist or his reagents. Recent surveys of certain laboratories showing an incidence of falsely positive reactions approximating 50 per cent are further evidence of laboratory error rather than of variability of the patient's serum.

I trust this criticism will be considered constructive, because I am sure that all the members have as I do, only the greatest admiration and praise for the investigative serologists, who have advanced serologic study beyond the days of complement fixation. Nevertheless, I feel that they should share the problems of the clinician by realizing that, after all, specificity is the first and foremost criterion of a good serologic test.

DR. STEFAN ROTHMAN, Budapest, Hungary.: Since the introduction of the sensitive flocculation tests the serodiagnosis of syphilis has become a highly trusted, almost perfect procedure. The statements, found even nowadays, that from 20 to 30 per cent of persons with late syphilis give a negative serologic reaction belong to the past.

I was interested in hearing the opinion of Dr. Kahn about the primary negative phase. I mean the statement that with the seropositive stage a new kind of disease in the immunologic sense begins. The spirochetes now acquire new properties in their relation to the body. This change may be the consequence of an allergic process, the peak of which is the appearance of the secondary rash. This high point of antigen-antibody reaction is connected with a catastrophic decomposition of spirochetes. This opinion is based on model experiments with

patients with trypanosomiasis and other diseases. It may be seen that the seronegative and the seropositive stage are different diseases from the therapeutic standpoint.

Another immunologic change may occur in the tertiary stage, when the small number of spirochetes becomes destructive and iodine therapy becomes effective.

Dr. William H. Goeckerman, Los Angeles, Calif.: The previous speakers have called attention specifically to the paradoxic Wassermann reaction. I think most of the members have been faced with that problem in one way or another. I should like to call attention to two factors which might cause a paradoxic reaction and which I think are not as well recognized as they might be: 1. There is hardly any question that at least moderately positive Wassermann reactions may be produced by certain types of diet. I am thinking particularly of the excessive use of milk and its products. When these lipoid foods have been ingested rather freely, an exceedingly confusing positive report is not uncommon. Elimination of fats promptly brings a negative reaction. 2. Ingestion of certain drugs may bring about variation. I am thinking in this instance about the ingestion of certain patent drugs. In 1 case that I followed for some time a person was trying to reduce weight by taking a so-called patent medicine. This patient repeatedly had a positive test until it was recognized that she was taking this drug. When the drug was discontinued, there was no further trouble with the Wassermann reaction.

Dr. Harry M. Robinson, Baltimore: The practical application of Dr. Kahn's paper is of paramount importance. I should like to mention 2 cases:

Case 1.—A man 72 years of age came to me because of a bothersome lesion in his hand. This lesion suggested nodular serpiginous syphilid. A specimen of blood was taken, and the patient was asked to return the next day. The reaction was positive, but another specimen was taken and tested. When he returned he was told that he had syphilis. The man was vehement in his denial. He could not imagine such a thing; he could not see how it could have happened. In addition to the positive serologic reactions, the man had what appeared to be unquestionable nodular syphilid.

Case 2.—A woman about 21 years of age came to me because of mild itching. Serologic studies were made, and the report was positive. The patient was so positive that she did not have syphilis that further specimens were taken. The second test gave a positive result. After three positive tests which she would not accept I decided to send specimens of blood to other laboratories. Three other laboratories gave negative reports, and in view of the fact that the girl gave no history of exposure and had no lesions of any kind, she was dismissed without treatment. It was never possible to find out why my laboratory obtained positive results while others reported negative results.

Of course this discussion is not meant to disparage the serologic study of syphilis. In fact, I feel convinced that the greatest aid in the diagnosis of syphilis is the examination of blood of as many patients as possible, not only when there is a suspicious element present, but even when there is not. Certainly, with an incidence of syphilis of as high as 1 per cent in the more educated group and as high as 10 or more per cent in the less educated group, one should not hesitate to make tests for syphilis. The important thing is the evaluation of those tests. There has just been instituted in Baltimore a survey of, I think, twenty-four laboratories. I took blood personally from several members of my staff and students, and some of them had positive serologic reactions, one specimen being reported positive by four laboratories. The remaining laboratories reported

negative results on these control specimens. The outcome of that survey has been the formation of a voluntary association of the laboratories of Maryland, with the idea of trying to improve the technic. Serologic tests are indicated as often as possible, with careful evaluation of the results.

DR. JOSEPH V. KLAUDER, Philadelphia: I wish to add a few remarks relative to an aid in the interpretation of serologic reactions. I refer to slit lamp examination for determining the presence of old blood vessels and other changes in the cornea of the patient who has once had interstitial keratitis and therefore congenital syphilis. That procedure has helped me considerably in studying patients with a positive Wassermann reaction (I refer to adult patients) of usually less than 4 plus, without any history or clinical evidence of syphilis. In order to see old blood vessels, one may use the + 20 lens of the ophthalmoscope when the pupil is dilated. The blood vessels appear like scratches on a smooth surface—like a windowpane, for example. Slit lamp examination of the cornea would be required to diagnose old interstitial keratitis. One familiar with slit lamp examination can diagnose old interstitial keratitis from the appearance of the cornea. I feel that such examination should always be made in cases in which serologic tests leave the diagnosis in doubt.

DR. REUBEN L. KAHN, Ann Arbor, Mich.: The discussion of paradoxic reactions has been enlightening to me as a student of serology, and I want to thank all the members for their kind interest. Unfortunately, time does not permit me to take up the various questions raised in the discussion.

Specificity should be of first and foremost importance in a serologic test. Apparently no test for syphilis today is 100 per cent specific. However, the fact that in five evaluations the Kahn test gave only 0.06 per cent false positive reactions shows that it is actually possible for a test for syphilis to give only 1 false positive reaction in 1,500 cases. A doubtful reaction, to my mind, should mean exactly what the term implies: that the reaction is neither definitely positive nor definitely negative, that further clinical and serologic studies are necessary to final diagnosis.

I should like to add that there is no excuse at present for employing a test for syphilis which has not shown a good record in the evaluation studies made by the United States Public Health Service; but even when one employs a test which has shown a good record in such studies, situations of the type that Dr. O'Leary mentioned may be encountered in isolated instances. Such situations should help to remind clinicians that they are dealing in syphilis with a biologic test which, although more dependable than in past years, requires critical clinical judgment for its correct interpretation.

HIDRADENITIS SUPPURATIVA; ABSCESS OF THE APOCRINE SWEAT GLANDS

A STUDY OF THE CLINICAL AND PATHOLOGIC FEATURES, WITH A REPORT OF TWENTY-TWO CASES AND A REVIEW OF THE LITERATURE

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Hidradenitis suppurativa is a chronic indolent inflammatory disease of the skin and subcutaneous tissue characterized by the formation of abscesses and sinuses and involving selected sites of the cutaneous surface, such as the axillary, mammary, inguinal, genital and perianal regions.

It has been known for many years that a peculiar type of sweat gland was situated in those regions of the skin in which the disease occurs. However, it was not until 1922, when Schiefferdecker [1] reported his studies on the apocrine glands, that the biologic significance of this modified type of sweat gland was determined. Involvement of only those regions of the cutaneous surface in which the apocrine glands are situated is more than coincidental, as it has been shown that this peculiar type of sweat gland is primarily involved in the suppurative process.

As an entity, hidradenitis suppurativa has failed to receive proper recognition in current textbooks of dermatology and surgery; in fact, the only article on the disease in the American or English literature is one by Lane [2] (1933), in which he discussed the condition with reference to the work of foreign authors.

The disease is much more common than is generally appreciated; it is obscured under such miscellaneous names as abscess or furunculosis

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Abstract of thesis submitted to the Faculty of the Graduate School of the University of Minnesota (1937) in partial fulfilment of the requirements for the degree of Master of Science in Dermatology and Syphilology (work done in the Section on Dermatology and Syphilology, the Mayo Clinic, Rochester, Minn.).

1. Schiefferdecker, P.: Ueber morphologische Sekretionserscheinungen in den ekkrinen Hautdrüsen des Menschen, Arch. f. Dermat. u. Syph. **132**:130-132, 1921; Die Hautdrüsen des Menschen und der Säugetiere, ihre biologische und rassenanatomische Bedeutung, sowie die Muscularis sexualis, Stuttgart, E. Scheizerbert, 1922.

2. Lane, J. E.: Hidrosadenitis Axillaris of Verneuil, Arch. Dermat. & Syph. **28**:609-614 (Nov.) 1933.

of the axillas, buttocks and so forth; pyoderma; chronic undermining burrowing ulcer of the skin; nonspecific granuloma, and fistulous disease of the buttocks.

Superficial abscesses involving the skin of the axillary, mammary and perianal regions were described by Velpeau [3] as early as 1839. That author was unfamiliar with the association of these abscesses with the sweat glands and classified the disease entity on the basis of its peculiar distribution.

Verneuil,[4] a French surgeon, has generally been given credit for the original description of the disease, and his name frequently has been affixed to the title. His excellent clinical observations appeared in a series of publications between 1854 and 1865. He suggested the association of these abscesses with the sweat glands, merely on the basis of his clinical observations.

Pollitzer [5] (1892) and Dubreuilh [6] (1893), working independently, described what they believed to be abscesses of the sweat glands (Verneuil) under the respective titles of hydradenitis destruens suppurativa and *hydrosadénites suppuratives disséminées.* However, after the report by Barthelemy,[7] shortly thereafter, it was recognized that the lesions which they described were papulonecrotic tuberculids.

The disease entity hidradenitis has been known in this country prior to Lane's report; Cole and Driver [8] in 1928 and Corson and Knowles [9] in 1935 presented patients before the dermatologic societies of Cleveland and Philadelphia, respectively. The article by Lane,[2] in 1933, contained reports of no cases but consisted of a résumé of the foreign literature. The author expressed disappointment that he had observed no cases of hidradenitis suppurativa, since he had discovered that few and inconclusive studies had been made on the question of the origin of the disease in the sweat glands. In his experience the disease was confined to the female sex and occurred in the axillas.

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3. Velpeau, cited by Verneuil.[4]

4. Verneuil, A.: Études sur les tumeurs de la peau: de quelques maladies des glandes sudoripares, Arch. gén de méd. **94**:447-468 (Oct.); 693-705 (Dec.) 1854; De l'hidrosadénite phlegmoneuse et des abcés sudoripares, ibid. **114**:537-557 (Nov.) 1864; **115**:327-337 (March); 437-453 (April) 1865.

5. Pollitzer, S.: Hydradenitis Destruens Suppurativa, J. Cutan. Dis. **10**:9-24 (Jan.) 1892.

6. Dubreuilh, W.: Des hidrosadénites suppuratives disséminées, Arch. de méd. expér. et d'anat. path. **5**:63-101, 1893.

7. Barthelemy, cited by Pollitzer.[5]

8. Cole, H. N., and Driver, J. R.: Multiple Abscesses of Axillary Sweat Glands, Arch. Dermat. & Syph. **19**:310 (Feb.) 1929; Hydradenitis Suppurativa, ibid. **19**:1025 (June) 1929. (Both reports describe the same case.)

9. Corson, E. F., and Knowles, F. C.: Hidradenitis Suppurativa, Arch. Dermat. & Syph. **34**:346 (Aug.) 1936.

DISTINGUISHING CHARACTERISTICS OF THE APOCRINE AND THE ECCRINE GLANDS

There are many peculiar characteristics which Schiefferdecker [1] has brought out to distinguish the various types of sweat glands.

The eccrine, or ordinary, sweat glands are small simple tubular glands distributed over practically the entire cutaneous surface, being most abundant on the palms and soles. They are derived directly from the epidermis and become active within the first few months of life. The eccrine glands function by the simple secretion of the sweat through the coil ducts, which open directly on the epidermis without relation to the hair follicle.

The apocrine glands, in contrast to the eccrine glands, are large compound tubular glands situated at a greater depth in the corium. They are restricted to certain zones of distribution, normally only the axillary, mammary, inguinal, genital and perianal regions. The origin is from

TABLE 1.—*Summary of Differential Characteristics of Sweat Glands*

	Eccrine Glands	Apocrine Glands
Origin.....	Epidermis; during fetal life	Hair anlage; at puberty
Type.....	Small simple tubular	Large compound tubular
Distribution.....	Generalized with few exceptions; most abundant on palms and soles	Regional; axillas, groin, genitalia and perianal region in both sexes; mammary gland in women
Mode of function and secretion	Simple fluid secretion of sweat through coil ducts directly onto epidermis	Evacuation of cellular content through ducts into hair follicle or onto epidermis adjacent to gland
Staining reaction	Negative for iron	Positive for iron in 70 per cent of cases (Homma)

the hair follicle (anlage), but activity is usually not manifest until about puberty. The apocrine glands function by rupture of the cell membrane, with resulting evacuation of the cellular protoplasm into ducts, which open either directly into the hair follicle or on the epidermis adjacent to the follicle. A close relation exists between the origin, distribution and mode of excretion of this type of sweat gland and the hair follicle (table 1).

The eccrine glands excrete a transparent liquid, the chief constituents of which are water, salt, urea and fatty acids, while the apocrine glands produce a thicker secretion of a complex unknown composition with a decidedly characteristic odor.

Homma [10] said that about 70 per cent of the specimens of apocrine glands that he examined with Turnbull's alum-carmine stain disclosed the presence of iron. He found that iron occurs in the apocrine glands

10. Homma, H.: Ueber positive Eisenbefunde in den Epithelien der apokrinen Schweissdrüsen menschlicher Axillarhaut, Arch. f. Dermat. u. Syph. **148**:463-469, 1925.

obtained from any site, whereas the eccrine glands do not show this peculiarity.

According to the studies of Woollard,[11] the average apocrine gland is 50 mm. long, 2 mm. wide and from 3 to 5 mm. deep. The lumen of the duct is 0.11 mm. in diameter. The color of the gland is reddish, whereas the other glands are yellow.

CLINICAL APPEARANCE AND SYMPTOMS

Hidradenitis suppurativa is essentially a disease of adult life, the majority of patients being in the second or third decade of life. The disease as a rule affects robust persons who are rather well nourished and developed. It occurs without associated systemic disturbance or impairment of the general health.

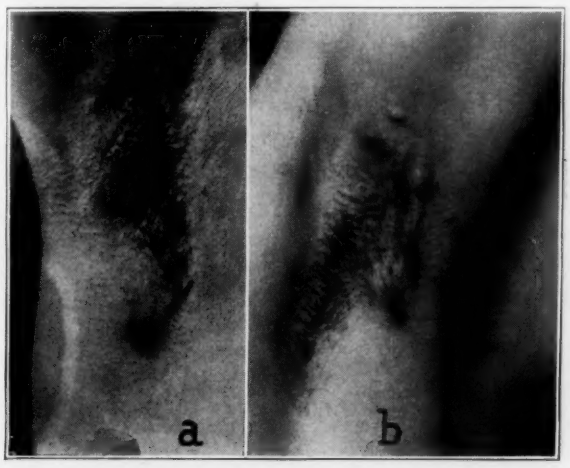


Fig. 1.—Involvement of, *a*, right axilla and *b*, left axilla in early stage of hidradenitis suppurativa (case 16); the abscess and the formation of cords simulate furunculosis.

Early Stage.—The disease usually begins insidiously. Pruritus, burning and local hyperhidrosis are frequently the earliest symptoms. Later, as the inflammatory reaction increases, vague pains may develop, and a small firm subcutaneous nodule may be appreciated as the first sign of the disease. Involution of the abscess may occur without drainage; however, absorption is usually slow, and the residual infiltrate may be perceptible for several weeks.

New nodules frequently appear adjacent to the original lesion. These coalesce to form a characteristic cordlike elevated band (fig. 1). Suppu-

11. Woollard, H. H.: The Cutaneous Glands of Man, J. Anat. **64**:415-421 (July) 1930.

ration is usually not apparent; it is difficult to demonstrate at this stage, as it is invariably deep seated. A small pustule may be present at the summit of the nodule. Incision of the pustule usually reveals only a few drops of thick creamy pus. Drainage may continue for several days before eventual cicatrization and complete healing take place. This is the usual course of the disease in its mild form, when only one or a few individual abscesses are present and when the response to treatment is favorable.

Late Stage.—However, in more protracted disease suppuration may persist and extend into the deep layers of subcutaneous tissue, with the formation of extensive sinus tracts. Frequent remissions and relapses may occur, and healing may be delayed for several months. The exten-

Fig. 2.—Late stage of hidradenitis suppurativa involving the right axilla: excavating ulcers and multiple sinuses simulate scrofuloderma.

sive undermining and burrowing that occur throughout the subcutaneous tissue are characteristic features of the disease (fig. 2). Inversion and undermining of the cutaneous margin occur, with destruction of the subcutaneous fat and connective tissue, leaving epithelial bridges to connect the sinus tracts. The border of the ulcer is ragged and rolled in, and palpation discloses a boggy sensation. The base of the ulcer is usually covered with healthy-appearing granulation tissue. This is covered with little seropurulent discharge, as suppuration extends beneath the surface. Gangrene does not occur. Fever and associated systemic reaction in connection with recurrent bouts of regional erysipelas are not uncommon.

About the anus extension of the disease process through the deep tissue (fig. 3) may continue, with eventual perforation of the rectum and formation of anal fistulas, as described by Geber [11a] as early as 1885.

ANALYSIS OF CASES

This report is based on a study of 22 cases of hidradenitis suppurativa observed at the Mayo Clinic from 1933 to 1937 (table 2).

Twelve of the patients were women and 10 men. The youngest patient was 16 years of age and the oldest 48; the average age of the patients was 30. In 17 cases the disease occurred between the age of

Fig. 3.—Involvement of the posterior surface of the scrotum and the inner surface of the left thigh (case 1), with deep induration and multiple sinus tracts. (The perianal region was similarly involved and a fistula in ano was present.)

21 and 38; 11 patients were in the second decade of life. In 3 cases the disease had been present for ten years when the patient was admitted to the clinic; the shortest duration was three weeks, and the average for the whole group was two years.

In 7 cases the axillas alone were involved; in 3 cases there was involvement of all the typical sites but the breasts, and in 1 case the disease was present in all the typical sites. Onset of the disease occurred

11a. Geber, E.: Anomalies of the Sudoriparous Glands and Their Function, in von Ziemssen, H.: Handbook of Diseases of the Skin, New York, William Wood & Company, 1885.

TABLE 2.—*Clinical Data in Twenty-Two Cases of Hidradenitis Suppurativa*

Case	Age	Sex	Duration of Disease	Site Involved						Associated Lesions	Bacteriologic Findings	Pathologic Picture
				Right Axilla	Left Axilla	Groin	Genitals	Perianal Region	Breasts			
1	36	M	7 yrs.	+*	+	+	+	+	—	.....	Hemolytic streptococci (anaerobic); guinea pig inoculation negative	Typical; advanced stage
2	21	M	16 mos.	+*	—	—	—	—	—	Acne indurata	Hemolytic streptococci (anaerobic); Staphylococcus aureus; guinea pig inoculation negative	Typical; early and advanced stage
3	27	F	10 yrs.	+	+	+	+	+	+	Seborrhea; hypertrichosis	.....	Typical; advanced stage
4	29	F	3 yrs.	—	+	+*	+	+	+	Acne indurata	Streptococcus viridans; Staphylococcus aureus; guinea pig inoculation negative	Not diagnostic; nonspecific granuloma
5	38	M	4 yrs.	+*	+	—	+	—	—	.....	Micrococcus	Typical; advanced stage
6	25	F	3½ yrs.	+*	+*	+	+	+	—	.....	Streptococcus viridans	Typical; advanced stage
7	26	F	4 yrs.	+	+*	+	—	+	—	History of furunculosis	Gram-positive cocci; guinea pig inoculation negative	Typical; advanced stage
8	42	F	6 yrs.	+	+	—	—	+*	—	.....	.....	.....
9	44	F	?	+	+	—	—	—	+	Acne indurata	.....	.....
10	48	M	10 yrs.	+	+*	+	—	—	—	.....	Micrococcus	Not diagnostic; nonspecific granuloma
11	23	F	10 yrs.	+	+	—	+	+	—	.....	.....	Atypical; inflammatory sinus
12	48	M	3 mos.	+*	+	—	—	—	—	.....	Hemolytic streptococci (anaerobic)	Typical; early stage
13	30	M	7 yrs.	—	—	—	—	+*	—	Acne indurata	.....	Atypical; inflammatory tissue
14	32	F	4 yrs.	+	+	+	+	+*	—	Pyoderma of chin; history of furuncles	Streptococcus viridans; Staphylococcus aureus	Typical; advanced stage
15	33	M	7 mos.	+*	+	—	—	—	—	.....	.....	.....
16	21	F	6 yrs.	+*	+	—	—	+	—	Impetigo, previous to onset of present illness	Hemolytic streptococci (anaerobic); Staphylococcus aureus	Typical; early and advanced stage
17	21	M	1½ yrs.	—	+	+	—	+*	—	Acne indurata	Hemolytic streptococci (anaerobic)	Typical; advanced stage
18	28	M	?	+	+	+	—	+*	—	Acne indurata	.....	Typical; early and advanced stage
19	16	F	2 mos.	—	+*	—	—	—	—	.....	Micrococcus	
20	23	M	3 wks.	—	+*	—	—	—	—	Acne indurata	.....	.....
21	27	F	1 mo.	+*	—	—	—	—	—	.....	.....	.....
22	33	F	15 mos.	+*	—	—	—	—	—	.....	Hemolytic streptococci (anaerobic); guinea pig inoculation negative	Typical; advanced stage

* Site of origin.

in the axilla in 13 cases; in 1 of these cases both axillas were involved simultaneously. In 5 cases the disease began in the perianal region, and in all but 1 of these cases the axillas became involved subsequently. In 1 case the disease first occurred in the groin but later appeared in the axilla. In those cases in which the disease began in one region and later involved another site the interval between the appearance of the initial lesion and the subsequent involvement varied from a few months to four years; the average interval was one year.

The Frei test for lymphogranuloma venereum gave a negative result in the 9 cases in which the groin and perianal region were involved. The intradermal tuberculin test (purified protein derivative) gave a negative result in the 8 cases in which it was performed. The results of inoculation of guinea pigs were negative in the 5 cases in which this procedure was employed.

The occurrence of hidradenitis suppurativa among persons with a seborrheic type of skin and associated acne is worthy of special consideration. Eleven patients had pustular dermatosis, mostly in the form of severe acne indurata of the face, neck and back; this had been present for a considerable time before the onset of the hidradenitis.

CAUSE

The cause of hidradenitis remains obscure. It is an infectious disease associated with a variety of bacterial organisms which may reach the sweat glands by different routes.

Trauma as a sequel to contact dermatitis or following the application of irritating deodorant lotions and depilatory creams and the frequent plucking or shaving of the axillary hair may play a role. The disease occasionally follows infection of the hand or fingers, which results in lymphadenitis and suppuration; the abscess either is incised or ruptures spontaneously, and the sweat glands become involved secondarily. It is in these sweat glands that the disease persists. In 2 cases in this series the disease started in this manner. In 1 of these there was a definite exacerbation of the process in the axillas whenever the dermatitis became more severe on the hands.

Smears and cultures were made in 13 cases. Hemolytic streptococcus of the microaerophilic type was found in 6 cases. Staphylococcus aureus and Streptococcus viridans were the most common organisms.

Meleney,[12] in a series of articles on "chronic undermining, burrowing ulcers of the skin," has reported repeatedly demonstrating the presence of the microaerophilic hemolytic streptococcus in anaerobic

12. Meleney, F. L., and Johnson, B. A.: Further Laboratory and Clinical Experiences in the Treatment of Chronic, Undermining, Burrowing Ulcers with Zinc Peroxide, Surgery **1**:169-221 (Feb.) 1937.

culture. He classified these ulcers as a distinct entity on the basis of this specific anaerobic streptococcus; however, cultures in some of his cases revealed the presence of hemolytic staphylococcus, Str. viridans, Staph. aureus and Staphylococcus albus. Just how much importance is to be attached to the presence of certain organisms is not known. A fertile soil may play as great a role as the presence of a specific bacterial organism.

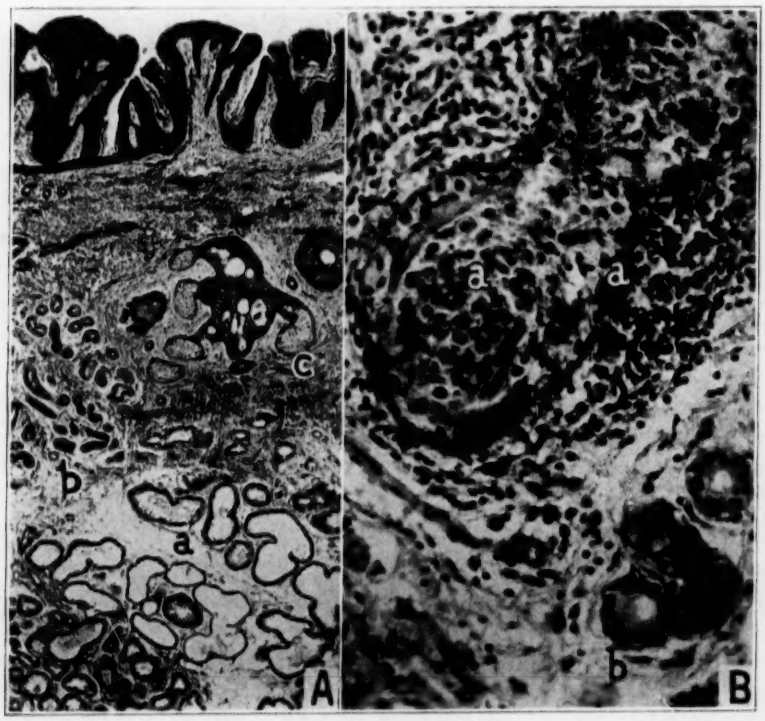


Fig. 4.—*A*, normal relationship of glands in the skin of the axilla of a Negro, *a*, in the apocrine, *b*, in the eccrine and *c*, in the sebaceous glands; specimen stained with hematoxylin and eosin; × 34. *B*, early stage of hidradenitis suppurativa, showing, *a*, acute inflammatory reaction within the lumen of the apocrine gland and in the periglandular connective tissue, and *b*, absence of involvement of the neighboring eccrine glands; specimen stained with hematoxylin and eosin; × 240.

HISTOLOGIC CHANGES

Microscopic examination of excised tissue was made in 16 cases; in 12 of these the histologic picture was uniformly typical. In 8 cases the pathologic changes were observed in serial sections.

The earliest cellular reaction is encountered in the subcutis, primarily within the lumen of the apocrine gland and in the neighboring periglandular connective tissue (fig. 4). (That the infection enters by way of the hair follicle and excretory tubule without having produced an inflammatory reaction until the gland proper is reached confirms the opinion expressed by Tachau.[13]) The infection proceeds through the subcutis by means of the lymph channels. Distended lymph spaces containing many leukocytes and clumps of cocci are present. Many apocrine glands in which the lumen is distended with leukocytes can be seen. There is little cellular reaction in the periglandular connective tissue, but in other areas the periglandular tissue may evidence considerable cellular reaction without involvement of the wall of the gland. If these areas are followed in serial section, invasion of the wall of the gland from without can be demonstrated easily. A primary rupture of the glandular epithelium was not demonstrable. This is in agreement with the observations of Gans.[14]

As the disease progresses and the infection spreads throughout the subcutaneous tissue, the eccrine type of sweat gland becomes similarly involved. The blood vessels present no change in the early course of the disease, but in the later stage a perivascular infiltrate of plasma cells and lymphocytes and edema of the walls of the blood vessels may be encountered.

Likewise, in the later stages, large pale-staining irregularly shaped giant cells with a deep-staining eccentrically placed nucleus are seen in the center of the disease process (fig. 5). These represent the remains of the epithelial cells which formed the wall of the gland. Foreign body type giant cells may be present.

The upper parts of the cutis and epidermis are not involved until extensive destruction has occurred throughout the subcutis. As the disease process continues, all the sweat glands in the involved region are destroyed.

DIFFERENTIAL DIAGNOSIS

In the early stage of the disease the clinical appearance may simulate that of furuncle, carbuncle, lymphadenitis, cellulitis or erysipelas. These diseases, however, may be distinguished, as their course is usually more rapid, their appearance is more acute and superficial and they are more frequently accompanied with systemic disturbance. Central necrosis

13. Tachau, P.: Schweissdrüsenabscess der Erwachsenen, in Jadassohn, J.: Handbuch der Haut- und Geschlechtskrankheiten, Berlin, Julius Springer, 1934, vol. 9, pt. 2, pp. 375-388.

14. Gans, O.: Zur Pathogenese der Achselhöhlenabszesse, Dermat. Wchnschr. **76**:318-325, 1923; Histologie der Hautkrankheiten: Die Achselhöhlenabscesse, Berlin, Julius Springer, 1925, pp. 360-362.

of the individual nodule with the formation of a "core" is uncommon in hidradenitis.

When the disease has progressed to the formation of a sinus and extensive ulceration, the clinical appearance may resemble scrofuloderma, noduloulcerative syphilis, actinomycosis, tularemia and (when it occurs in the perianal or inguinal region) lymphogranuloma venereum or granuloma inguinale. Study of the history, clinical observation, demonstration of the causative organism, serologic testing, use of specific intradermal tests and biopsy usually will serve to make a differential diagnosis.

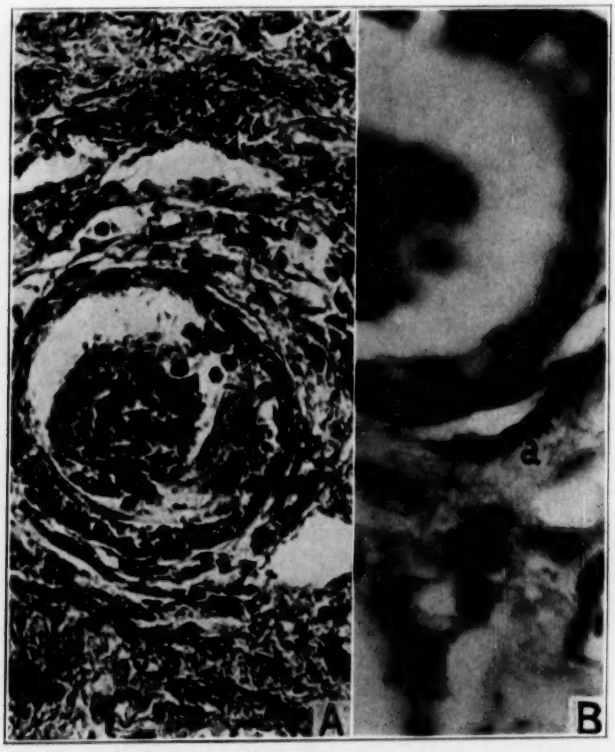


Fig. 5.—*A*, advanced stage of hidradenitis suppurativa, with destruction of the wall of an apocrine gland and early formation of peculiar giant cells, which are remains of the glandular membrane; specimen stained with hematoxylin and eosin; × 415. *B*, clumps of cocci, *a*, situated about the wall of the gland; specimen stained with Brown's modification of Gram's stain; × 950.

PROGNOSIS

In the early stage of the disease, when only one or a few localized abscesses are present, response to treatment may be favorable, and the disease may last only a few weeks. The prognosis, however, in each

case must be guarded, as despite all therapeutic measures, the disease may progress to the formation of extensive and persistent sinuses. There may be frequent remissions and relapses, and the subsequent course may be protracted.

When the disease begins in one axilla and healing takes place, sometime later it may appear in the corresponding axilla or in one of the other favorite locations. The prognosis, however, for life is good, and serious complications such as septicemia are rare.

TREATMENT

In general, treatment may be divided into that of a conservative and that of a radical nature. Each patient presents an individual problem, and the choice of the method of treatment depends on the stage of the disease present when the patient first comes under observation.

In the early stage of the disease the two most valuable methods of treatment are prompt incision of the individual abscess with the establishment of adequate drainage and the use of filtered roentgen rays. Local measures, including the use of a zinc peroxide paste as described by Meleney,[12] sulfur baths and ultraviolet irradiation are beneficial. Administration of sulfanilamide is of value, particularly in those cases in which the hemolytic streptococcus is cultured. Nonspecific therapy, including the use of neoarsphenamine for its tonic effect, the injection of whole milk and the administration of typhoid vaccine, may be considered. The use of autogenous vaccine or toxoid did not give encouraging results in this series of cases.

When the disease is far advanced and fails to respond to conservative management, total excision and complete destruction of all the glands in the affected region and plastic repair are sometimes necessary.

SUMMARY

The disease is characterized by the formation of abscesses and sinuses in selected regions of the cutaneous surface in which the apocrine type of sweat glands are situated. The favorite sites of involvement are the axillary, mammary, inguinal, genital and perianal regions. The disease affects young adults, usually occurring in the second decade of life. The course is extremely chronic, and frequent remissions and relapses occur. The essential histologic features include primary involvement of the apocrine sweat glands and dissemination of the disease throughout the subcutaneous tissue by means of the lymph channels. Therapeutic measures include surgical incision and irradiation with filtered roentgen rays in the early stage and excision and plastic repair when the disease is far advanced.

ABSTRACT OF DISCUSSION

Dr. William H. Goeckerman, Los Angeles: As Dr. Brunsting stated, I do not believe any textbook gives an adequate description of hidrosadenitis suppurativa. Even such an elaborate piece of work as Jadassohn's hand book (Handbuch der Haut- und Geschlechtskrankheiten, Berlin, Julius Springer, 1927) does not do justice to this type of dermatosis.

I think most dermatologists suspect that early lesions occurring in the axilla are hidrosadenitis, but I have repeatedly noticed that when cases of advanced disease are presented for the first time at dermatologic meetings, comparatively few of the members suspect this type of infection. It is not uncommon to find discussion centering largely about tuberculosis and syphilis. In such cases there may be repeatedly positive Wassermann tests of the blood, as Dr. Brunsting pointed out, or the section may suggest tuberculous involvement to the ordinary histologist. Advanced disease presents the difficult diagnostic problems. Cases of early disease are of practical importance because of the necessity of careful treatment. It is not uncommon to find that such disease has been seen by the practitioner or even the dermatologist and has been looked on as recurrent furunculosis, treated and then dismissed, after which it recurs. Once the disease has established itself, as Dr. Brunsting pointed out, it may become resistant to any form of treatment, and I think all the members with large services in the large county hospitals will encounter one or more patients with this disease as a permanent chronic invalid.

I have been interested in the question of cause. A priori, one would assume that the pyogenic infection would enter by the stoma of the apocrine glands, especially as it is found in the axilla or where irritation is commonly seen. Dr. Brunsting pointed out the various factors that may come into play, yet a number of careful students of the subject have expressed the belief that the disease practically always enters by the lymphatic channels. I should favor the latter view, except that I think irritation may play a precipitating part.

I think all the members, as we watch cases coming under observation with this particular disease in mind, will find it is not uncommon.

Dr. Donald M. Pillsbury, Philadelphia: Dr. Brunsting has given an interesting presentation of a group of cases of a difficult disease from the standpoint of diagnosis and treatment. If I understood him correctly, he stated that in the 8 cases in which the tuberculin test was done it was negative. It seems that this evidence of anergy to tuberculin can hardly be the result of chance, and I wonder whether similar findings have been reported in the literature and whether this finding may furnish some light on the cause of the disease; possibly the disease represents a sarcoid state.

Dr. Henry A. Brunsting, Toledo, Ohio: Concerning the question raised by Dr. Pillsbury, I may add that of the 8 cases in which the intradermal tuberculin test was performed, microscopic studies and inoculation of guinea pigs in 5 failed to reveal evidence of tuberculosis. A negative reaction to the tuberculin test was not the only criterion used to rule out a diagnosis of tuberculosis.

TINEA NODOSA OF THE SCALP HAIR IN SCHOOL CHILDREN OF SOUTH SIAM

W. HARDING KNEEDLER, M.D.
CHIENG MAI, SIAM

While I was working temporarily in Trang, South Siam, my attention was called to a nodular condition of the scalp hair by a teacher, who told me that a year before only 1 girl in her class had known that she had the condition but that within a few months all 12 girls in the class had it. I examined these children and sent some of their hair to America, where Dr. Fred D. Weidman, of the University of Pennsylvania, confirmed the diagnosis of tinea nodosa.[1] I was surprised later to find a high incidence of the condition among school children in Trang, with cases in every class in the four schools which I investigated. The disease had been well known in the district for at least thirty years. The name for it may be translated as "flowering of the hair." Since I believe that no similar condition has been reported from this part of the world, and since the disease encountered in Siam seems to have some unique features, I have felt it worth while to publish my observations.

DESCRIPTION

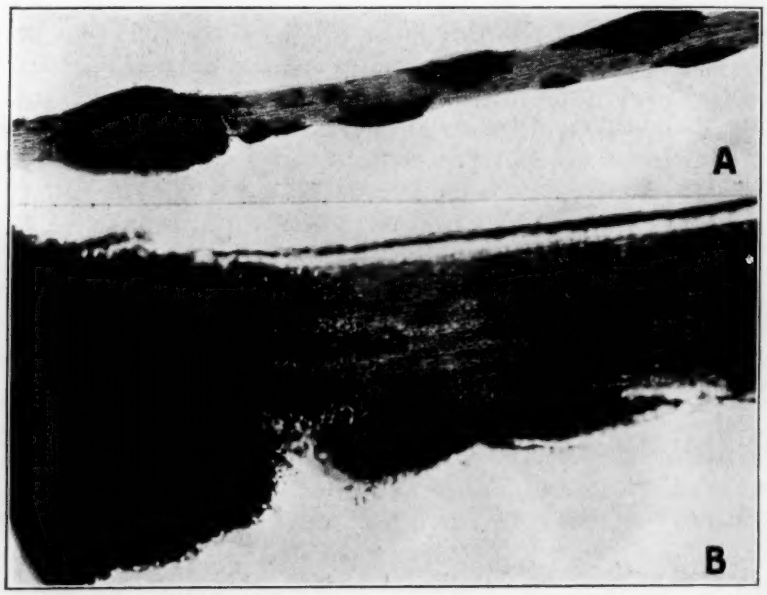
Black nodules of varying size, smaller than nits, are attached to and tend to encircle the hairs, usually eccentrically. A nodule may be ⅛ inch (0.3 cm.) long but is usually much smaller. The larger nodules are usually found along the distal portions of the longer hairs and are discrete. In some cases the accretion is attached along the length of the scalp hairs and can be more easily felt as a slight roughness of the hair than seen by the naked eye. All gradations between these two forms of involvement occur, and the two are usually mixed in varying degrees in the same patient. In the majority of cases only a part of the hair of the scalp is involved, in some only the distal parts of the longer hairs of a single area being affected. Only the distal parts of the long hairs need be examined, since if these are not involved the disease is unlikely to be present elsewhere. The shafts of the hairs are never involved, nor do the hairs break easily. The scalp itself is unaffected. The accretion is brittle, and many of the larger nodules can be removed by drawing the hair between the nails of the thumb

1. Accession No. 3029, Laboratory of Dermatological Research, University of Pennsylvania. Material to be deposited in the Army Medical Museum.

and the index finger, a practice followed by some of the natives. When the hair is cut and put away for some time, many of the nodules will be found to have dropped off spontaneously.

INCIDENCE

While adults of both sexes have occasionally consulted me because they have recently acquired the disease, it appears to be much more common in children. In Siam, children have their hair cut as do those in America; practically all boys wear short hair, parted, and practically all girls wear bobbed hair. As would be expected on account of the



Tinea nodosa, showing black nodules of solid fungous material on a hair. *A* shows a hair magnified 72 times. *B* shows the size and the color of the individual spores; × 306.

longer hair, the incidence is higher in girls than in boys. For the purpose of study, elementary schools with a predominance of girls, but with enough boys to show the relative incidence of the disease in the two sexes, were selected. Two Siamese schools and two Siamo-Chinese schools in Trang were selected to show both the average incidence and the difference of incidence between the two groups. One Siamese school was selected at Sritamarat, about 100 miles (175 kilometers) northeast of Trang, on the other side of the Malay Peninsula, in order to compare the incidence of the disease with that at Trang. Officials of all the schools approached showed the utmost courtesy in cooperating in this study.

The incidence was about the same in the two Trang Siamese schools, and in the two Trang Siamo-Chinese schools. The children of all the schools were fairly clean, but the Siamese group were definitely more clean than the Chinese, and this may account for the lower incidence in the Siamese schools.

The decidedly lower incidence of the disease in Sritamarat is noteworthy. Trang probably has as even a temperature and as high an average humidity as can be found in Siam. The temperature rarely goes below 70 F. or above 90 F. Sritamarat does not have a much greater variation of temperature but is considerably drier. Climatic conditions may have something to do with incidence, and it would be interesting to know whether the disease occurs in British Malaya, which is nearby, and how far north in Siam it is found. In more than five years of practice in Chieng Mai, 1,000 miles (1,743 kilometers) north of Trang, I never observed it.

Results of Study

	Children Examined		Children Affected		Percentage Affected	
	Boys	Girls	Boys	Girls	Boys	Girls
Siamese School 1, Trang	76	176	15	61	19.6	34.4
Siamese School 2, Trang	0	281	0	96		
Siamo-Chinese School 1, Trang	148	64	54	24	36.7	42.0
Siamo-Chinese School 2, Trang	73	36	27	18		
Average, Trang	...	...	..	..	28.2	38.2
Siamese School, Sritamarat	91	175	0	16	0	9.1
Totals	1,120		311		27.9	

The relative incidence of the disease by grades in school is shown from the observation of 457 girls in the two Siamese schools in Trang. This is as follows:

Grade	1	2	3	4	5	6	7	8	9
Percentage	30.9	41.7	45.0	43.2	30.6	38.4	35.1	20.0	14.3

It will be seen that the incidence reaches a maximum at the third grade. Perhaps the preschool child has less opportunity of contracting the disease because of the closer association which school children have with each other. The decline as children reach the higher grades is in conformity with the observation that the disease is less common in adults. In Trang there were cases in every grade of every school, while in the Sritamarat school, in which there were only 16 cases altogether, these were distributed through seven of the ten grades investigated with no more than 4 in any one grade.

The ages of all children found diseased (without reference to the total numbers of children of each age examined) was as follows:

5-7 years	8-10 years	11-13 years	14-16 years	17-19 years
39	100	102	68	7

COMPARISON OF INCIDENCE WITH THAT OF PEDICULOSIS

In Trang, the incidence of pediculosis of the scalp among the children examined was 15 per cent, whereas in Sritamarat, where tinea nodosa was much less common, the incidence of pediculosis was 30 per cent. In neither place was there any correlation between the diseases, the percentage of pediculosis among patients with tinea nodosa being approximately the same as among those who did not have tinea nodosa.

INFLUENCE OF USE OF OIL ON THE SCALP

Of 76 children who had tinea nodosa, 31 said they used oil on their hair and 45 said that they did not do so.

CONTAGION

The promiscuous use of hairbrushes and combs seemed to be an important source of contagion, in addition to exposure in the barbershop and of children playing together. Of the 16 cases at Sritamarat, 3 were in sisters who stated that the disease had first appeared in their parents, the children acquiring it later; this entire family used the same comb. Of 72 children in Trang who were asked, 28 said that they knew their brothers or sisters were affected.

DURATION OF THE DISEASE

The duration of the disease was difficult to determine. The low incidence among adults suggests that it may disappear spontaneously. It causes no discomfort, and the majority who suffer from it are either unaware of its presence or pay little attention to it. Those who bother about it usually do so because they consider it unclean or because they do not like to have their hair rattle when they comb it. In blond hair the black nodules are conspicuous, but an overwhelming majority of Siamese have black hair. Of 50 children who were asked, 16 said that they knew the disease was of long standing.

TREATMENT

The most effective treatment is shaving the head, which gets rid of the trouble at once. Boys usually do not object to this, but girls seldom allow it. Three methods of treatment were tried: 1. The hair is washed with soap to remove oil and then wet with a 1 : 1,000 solution of mercury bichloride and allowed to dry. This is repeated daily for five days a week. 2. The hair is washed with soap and water in the morning, after which 2 per cent solution of formaldehyde in alcohol is applied; from 3 to 5 per cent sulfur ointment is applied at night (Cas-

tellani's method). 3. The hair is washed with 2 per cent red mercuric iodide soap,[2] allowed to dry and rinsed with water an hour later. This is done five days a week.

All methods of treatment showed some good results, the last method being apparently the most effective. In cases in which the disease was severe about two months was required to rid the hair of accretions. Some of the nodules are apt to come off at each washing, but before they are entirely gone the hair containing them must apparently grow out and be cut off. Treatment prevents old accretions from growing and new ones from forming. It is probable that existing nodules are sterilized by treatment long before they disappear, so that perhaps the treatment need not be pursued intensively.

The most effective treatment would apparently be a method of dissolving the accretions. With this in mind, I tried prolonged soaking of affected hairs in vitro without effect in the following liquids: 95 per cent alcohol, acetone, carbon tetrachloride, gasoline, ether, chloroform, olive oil, 5 per cent acetic acid, saturated sodium bicarbonate and weak and strong ammonia. It was noted that the nodules gave off bubbles of gas in hydrogen peroxide and that if soaked in hydrogen peroxide and then in household ammonia the nodules could be dissolved off; this treatment, however, would not be practicable.

SUMMARY

Among 1,120 school children examined in South Siam, 311 were found to have tinea nodosa of the scalp hair.

The disease in Siam is comparatively uncommon among adults.

The shaft of the hair is not invaded.

The disease is definitely contagious.

There is no relation in incidence between tinea nodosa and pediculosis.

The use of oil on the hair does not seem to be an important factor in the incidence of the disease.

The most effective treatment next to shaving the scalp is washing with red mercuric iodide soap; a satisfactory solvent for the nodules has not been found.

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2. A commercial product known as Neko soap, made by Parke, Davis & Co., has been used.

ROLE OF SWEAT AS A FUNGICIDE

WITH SPECIAL REFERENCE TO THE USE OF CONSTITUENTS OF SWEAT IN THE THERAPY OF FUNGOUS INFECTIONS

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HERBERT ROSENFELD, M.D.

WILLIAM LEIFER, M.D.

AND

WILLIAM BIERMAN, M.D.

NEW YORK

Our interest in the constituents of sweat was aroused by the conception that sweat may play a role as a protective coating against parasites and fungous infections in particular. The idea has especially interested us since in a previous communication two of us [1] demonstrated that a number of the lower fatty acids found in sweat were fungicidal and fungistatic.

We then determined to study the fungicidal power of the sweat and of its individual components. When this fungicidal power was established, an attempt was made to treat fungous infections by topical application of some of the ingredients, singly and in combination.

The importance of such therapy lies not in the fact that new and startling fungicidal agents are presented but in the fact that a more nearly physiologic approach to the therapy of fungous infections is proposed. Since these substances are more physiologic, they tend to be less irritating and thus to decrease the incidence of "ids," which are often complicating sequelae of the use of many fungicidal agents.

It would be of importance for the proposed treatment to establish a firm experimental basis for the conception of the fungicidal power of normal sweat and its role in determining a person's susceptibility to parasitic infection, and fungous infection in particular. Once this has been established, a form of therapy should be devised by which the fungicidal action of sweat would be increased.

Read at the Sixty-First Annual Meeting of the American Dermatological Association, Inc., Del Monte, Calif., June 9, 1938.

From the Laboratories and Service of Dr. Isadore Rosen, Mount Sinai Hospital, New York, and from the Skin and Cancer Unit of New York Post-Graduate Medical School and Hospital, Columbia University (Director, Dr. George Miller MacKee).

1. Peck, S. M., and Rosenfeld, H.: The Effects of Hydrogen Ion Concentration, Fatty Acids and Vitamin C on the Growth of Fungi, J. Invest. Dermat. **1**:237-265 (Aug.) 1938.

It is possible to increase the fungicidal elements in sweat either by the ingestion of certain foods or by administration of some of the fatty acids or their salts, in concentrated form or even parenterally, as we have attempted in a few instances.

It has not been possible so far for us to do more than outline in a number of experiments the direction of and framework for our theory. We believe, however, that our experiments have indicated that our working hypothesis is of practical importance.

MATERIALS AND METHODS

Sabouraud's Medium.—For the preparation of the solid medium a standard Sabouraud dextrose agar dehydrated (Difco) was used. Sixty-five grams of this material was dissolved in a liter of distilled water and sterilized at 15 pounds' (6.8 Kg.) pressure for twenty minutes. The final p_H of this medium was about 5.6.

The plates were inoculated on the surface, after cooling, with Trichophyton gypseum or Epidermophyton inguinale. A loopful of organisms was used. When the plate method was used for Monilia, 1 cc. of a dilute suspension of spores was placed in the bottom of the plate and the medium poured over them, with mixing, just before it began to harden. As a standard measure of the growth of Trichophyton and Epidermophyton, the size of the colony at the end of two weeks was used. The fungicidal agent was added to the medium in the required concentration just before the plates were poured. Five plates were used for each concentration studied. In the case of Monilia the number of colonies and general vigor of growth were taken as a standard.

Sabouraud's Bouillon.—Twenty grams of dextrose, plus 10 Gm. of neopeptone (Difco), was added to 100 cc. of distilled water. The mixture was put into an Arnold sterilizer for ten minutes, filtered through ordinary filter paper while still hot and autoclaved at 15 pounds' (6.8 Kg.) pressure for ten minutes. This medium was not suitable for the growth of fungi, as will be seen in a number of experiments to be cited later.

If the various amounts of the substances to be tested were added to the medium in the usual way, differing amounts of nutrient agar plus peptone would result in every tube. This might be a factor of error in judgment of the final effects. It was corrected by adding saline solution to the various substances investigated to make the desired concentration, the organisms themselves being suspended in 10 X Sabouraud broth, enough of this spore suspension being added to each tube to make the final concentration of medium equivalent to the ordinary Sabouraud bouillon, that is, a 1 : 10 solution of the 10 X medium.

Pellicle Method.—With Sabouraud's bouillon we have a convenient method for testing the fungicidal power of the various substances studied on T. gypseum. It is possible to test their effect on this organism because after the spores are inoculated in the depths of the fluid medium they first grow in the form of a cloudy suspension (partly under anaerobic conditions) and finally reach the surface and form a pellicle on it. The degree of growth is measured by the amount of subsurface floc and by the size of the surface pellicle.

As will be seen from the experiments by the plate method, T. gypseum is much more resistant to fungicides than is E. inguinale; therefore, it can be taken for granted that a concentration of any one of the test substances which was lethal for T. gypseum would prove fungicidal for E. inguinale.

Organisms Investigated.—The fungicidal activities of the various substances were tested on T. gypseum, E. inguinale and Monilia albicans.

Method of Buffering.—Method 1: To 25 cc. of the medium was added enough normal hydrochloric acid or sodium hydroxide to yield the required hydrogen ion concentration. The final p_H was at first controlled by indicator methods, Clark's color charts being used as a standard. Color charts and even comparator tubes are only fairly accurate. Therefore, in all instances, the p_H given in the tables was measured with glass electrodes and a vacuum tube p_H meter.

Method 2: McIllvaine's buffers were added to the medium in the proportion of 2 cc. of the required buffer concentration to 10 cc. of the medium, and the mixture was again controlled for the final p_H. McIllvaine's buffers consist of mixtures of citric acid and sodium phosphate (Na_2HPO_4). These give a range of p_H from 2.2 to 8. To obtain a p_H of 9, sodium phosphate alone was added; for a p_H of 10, approximately 40 cc. of sodium phosphate plus 20 drops of normal sodium hydroxide was needed. The final p_H was then compared with standard Kolthoff buffers and controlled by electrometric measurements.

EXPERIMENTS

Fungicidal Power of Sweat.—Perspiration was obtained by two different methods:

Method 1: The patient was put into a cabinet heated with carbon filament lamps. A rubber sheet was placed under his trunk. After an hour the perspiration on the sheet was collected; small pieces of cotton were used to wipe the abdomen, and their contents of sweat were expressed. Only small quantities of sweat were obtained in this way.

Method 2: The patient was put into a silk-lined bag, which had been previously heated by lamps. By means of the short waves a temperature of 106 F. was maintained for five hours. The perspiration was collected in the bottom of a bag and was poured off at the end of the treatment. Large quantities of perspiration were obtained from individual patients by this method.

As soon as the sweat was obtained, sodium hydroxide was added to it until a faint pink color was obtained with phenolphthalein; this was done to preserve the volatile acids. The material was then filtered through a Seitz filter to render it bacteria free.

Experiment 1.—Two patients were made to perspire by method 2. A large quantity of sweat was obtained from each. Samples A and B, consisting of 295 and 275 cc., respectively, were obtained from the same patient (a man with the tabetic form of dementia paralytica) on two different occasions. Sample C (340 cc.) was from a man with arthritis. The sample designated as D was pooled sweat obtained from 9 patients by method 1.

A series of tubes of Sabouraud's bouillon containing sweat in concentrations of from 1 to 90 per cent was prepared. The tubes were inoculated with T. gypseum according to the pellicle method.

Results: There was no inhibition of the growth of T. gypseum in any of the tubes. It could thus be seen that the dilute heat sweat prepared for this experiment was not fungicidal.

Experiment 2.—Samples A, B and D were then evaporated to dryness in the oven. A series of tubes of Sabouraud's bouillon containing from 1 to 10 per cent of this dried sweat was prepared. The fungicidal power of this dried sweat was tested against T. gypseum by the pellicle method.

Results: A 1 per cent concentration of dried sample A allowed 100 per cent growth; 2 per cent allowed 50 per cent growth; 3 per cent allowed moderate subsurface growth, and 4 per cent completely inhibited growth (fig. 1).

Fig. 1.—Fungistatic and fungicidal effect of concentrated alkalinized heat sweat on T. gypseum.

A 1 per cent concentration of dried sample B in Sabouraud's bouillon allowed 100 per cent growth; 2 per cent allowed 60 per cent growth; 3 per cent allowed moderate subsurface growth; 4 per cent and 5 per cent allowed slight subsurface growth, and 6 per cent completely inhibited the growth of T. gypseum.

A 1 per cent concentration of dried sample D in Sabouraud's bouillon allowed 100 per cent growth; 3 per cent allowed 70 per cent growth; 5 per cent allowed some subsurface growth, and 7 per cent completely inhibited growth.

It is important to bear in mind that the sweat originally obtained was much more dilute than normal sweat. In addition, under normal conditions the evaporation of water from the cutaneous surface still further tends to concentrate the ingredients of the sweat. It cannot be stated with any degree of accuracy what relation there is between the actual water content of normal sweat and that of the heat sweat used in our experiments. The experiments indicate, however, that concentrated heat sweat does have fungistatic and fungicidal powers, even when made alkaline with sodium hydroxide.

Experiment 3.—Chemical analysis of samples C and D was made.[2]

We were particularly interested in determining the presence of some of the lower fatty acids in sweat and obtaining an idea of their quantity. To preserve the volatile lower fatty acids, sodium hydroxide was added to the sweat until a faint pink color was obtained with phenolphthalein. It was not practical to test for lactic acid. The higher volatile acid fraction, which was calculated as "caprylic acid," consists of either caproic or caprylic acid or a mixture of the two. Two samples of sweat were analyzed:

1. Sample D represented pooled sweat from 9 patients, alkalinized with sodium hydroxide and submitted for analysis in the fluid state. It contained 99.02 per cent water, 0.0062 per cent propionic acid, 0.0096 per cent acetic acid, 0.0096 per cent caprylic acid and 0.7 per cent sodium chloride. Tests for urea and for uric acid gave positive results.

Sample C was alkalinized with sodium hydroxide and evaporated to dryness before being sent to the laboratory for analysis. It will be recalled that sample C was obtained from a single patient with arthritis. It contained 0.0076 per cent acetic acid, 0.0091 per cent propionic acid and 0.0377 per cent caprylic acid.

The percentages indicated in the analysis of sample C were calculated on the assumption that, just as in sample D, the original moisture content was 99.02 per cent.

The most notable difference between the two analyses was the higher percentage of acids higher than propionic acid (calculated as caprylic). The acetic and the propionic acid content of the two samples of sweat were rather close to each other.

Experiment 4.—Determination of Vitamin C in Sweat: Two samples of sweat were analyzed for vitamin C content.[3]

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2. The samples of sweat were analyzed by Dr. C. Hoffman and his staff, of the Chemical Laboratories of the Ward Baking Co., New York.

3. Determinations of vitamin C were carried out by Dr. Philip Finkle, according to the method of L. J. Harris and S. N. Ray (Diagnosis of Vitamin C Subnutrition by Urine Analysis, with Note on Antiscorbutic Value of Human Milk, Lancet **1**:71-77 [Jan. 12] 1935).

1. Sweat was obtained from patient J. C., a white man, with a condition diagnosed clinically as tabes dorsalis, by method 1.

Analysis of the sweat for ascorbic acid showed 0.42 mg. per hundred cubic centimeters.

2. Sweat was obtained from patient J. S., a white man, with a condition diagnosed clinically as tabes dorsalis, according to method 1, from regions over the eyes, forehead and face.

Analysis for ascorbic acid showed 0.0862 mg. per hundred cubic centimeters.

It is of interest to note that the normal blood plasma contains from 0.6 to 2 mg. of ascorbic acid per hundred cubic centimeters.

Experiment 5.—If we were to make an artificial sweat of a composition based on our own analyses and on the reports in the literature, it should contain the following known constituents:

Substance	Amount, per cent
Water	99.0200
Propionic acid	0.0062
Acetic acid	0.0096
Caprylic and/or caproic acid	0.0046
Sodium chloride	0.7000
Lactic acid	0.1000
Citric acid	0.0100
Ascorbic acid	0.0040
Urea	Trace
Uric acid	Trace

Such an artificial sweat without the urea and uric acid was added to Sabouraud's bouillon so that the final concentration of the ingredients was that just given. T. gypseum was then inoculated according to the pellicle method. The p_H of the mixture was 3.37. No growth took place. It is difficult to evaluate the fungicidal properties of this artificial sweat, because T. gypseum is almost completely inhibited in its growth in Sabouraud's bouillon by such a low p_H.

Since it has been found that T. gypseum, E. inguinale and M. albicans will grow well on solid Sabouraud's medium at a p_H a little above 3, the artificial sweat was added to solid mediums so that the final concentrations of the ingredients were equivalent to those just given. Although no measurement of p_H was made of the solid mediums plus the artificial sweat, it could be assumed to be greater than 3, since solid Sabouraud's medium does not harden at p_H of 3 or less.[1]

T. gypseum and E. inguinale were completely inhibited, while M. albicans was retarded about 40 per cent in its growth. Thus, it was seen that this artificial sweat had fungicidal properties (fig. 2).

Experiment 6.—According to the figures given in the literature,[4] of all the ingredients of sweat which have fungicidal properties,[5] lactic acid is present in the highest concentration. It was for this reason that we decided to investigate the fungicidal effects of the addition of varying amounts of lactic acid to alkalinized heat sweat. One sample of sweat from each of 5 patients was obtained by method 1. Each sample of sweat was alkalinized as before described with sodium hydroxide. To each sample lactic acid was added, so that we finally had a series of five tubes for each sample, containing concentrations of lactic acid corresponding to from 100 to 500 mg. per hundred cubic centimeters of sweat. One-tenth cubic centimeter of a suspension of T. gypseum in 10 × Sabouraud's bouillon was added to each tube, so that the final volume was 1 cc., as for the pellicle method.

Results: The addition of a concentration of lactic acid corresponding to 100 mg. per hundred cubic centimeters of sweat to samples 1 and 2 completely inhibited the growth of T. gypseum; in sample 3, 100 per cent growth took place; in sample 4, 75 per cent growth took place, and in sample 5 only 50 per cent growth occurred. When the concentration of lactic acid was increased to 0.2 per cent, corresponding to 200 mg. per hundred cubic centimeters of sweat, there was complete inhibition of growth in all samples of sweat except no. 3, which allowed about 20 per cent growth (fig. 3).

This experiment serves further to show that the fungicidal action of sweat plus lactic acid was not due to the p_H value produced in the

4. Fishberg, E. H., and Bierman, N.: Excretion of Lactic Acid in Sweat, Proc. Soc. Exper. Biol. & Med. **29**:1021-1022 (May) 1932. Saiki, A. K.; Olmanson, G., and Talbert, G. A.: Simultaneous Study of the Constituents of Sweat, Urine, and Blood, Also Gastric Acidity and Other Manifestations Resulting from Sweating; Uric and Lactic Acids, Am. J. Physiol. **100**:328-330 (April) 1932. Rosen, I.; Rosenfeld, H., and Krasnow, F.: Effect of Hyperpyrexia in the Treatment of Chronic Recurrent Dermatosis, Arch. Dermat. & Syph. **33**:518-531, (March) 1936. Chatron, M. M.: Sur la composition chimique de la sueur recueillie dans les étuves romaines de Plombières-les-Bains, Bull. Soc. chim. biol. **15**:1107-1112 (Sept.-Oct.) 1933. Couraud, J.: Sur la répartition des acides organiques dans la sueur humaine, Compt. rend. Soc. de biol. **118**:155-156, 1935. Lilienfeld, A.; Wright, I. S., and MacLenathen, E.: Intramuscular Injection of Ascorbic (Cevitamic) Acid and Excretion in the Sweat, Proc. Soc. Exper. Biol. & Med. **35**:184-189 (Oct.) 1936. Cornbleet, T.; Klein, R. I., and Pace, E. R.: Vitamin C Content of Sweat, Arch. Dermat. & Syph. **34**:253-254 (Aug.) 1936. Mosher, H. H.: Simultaneous Study of Constituents of Urine and Perspiration, J. Biol. Chem. **99**:781-790 (Feb.) 1933. Rothman, S., and Schoof, F.: Chemie der Haut, in Jadassohn, J.: Handbuch der Haut- und Geschlechtskrankheiten, Berlin, Julius Springer, 1929. Engman, M. F., and Kooyman, D. J.: Lipids of the Skin Surface, Arch. Dermat. & Syph. **29**:12-19 (Jan.) 1934.

5. This will be demonstrated in later experiments.

Fig. 2.—Fungistatic and fungicidal effect of artificial sweat. Upper row (controls): The large colony on the extreme left is T. gypseum; the small colony is E. inguinale. M. albicans is in the plate on the right. Lower row: Artificial sweat was added to each of the plates (experiment 5); there was complete inhibition of growth of T. gypseum and E. inguinale and some retardation of growth of M. albicans.

Fig. 3.—The addition of 0.1 per cent lactic acid to sample 1 was sufficient to cause complete inhibition of growth of T. gypseum. Addition of 0.2 per cent lactic acid to sample 3 was required to cause complete inhibition of growth. Both samples of sweat were originally not fungicidal.

medium. Since all the samples of sweat were treated in the same way, the final p_H value was the same in all instances and the variation in the inhibition of growth of T. gypseum in the different samples of sweat was due to the fungicidal and fungistatic powers of the lactic acid plus the other ingredients. Sample 3, which allowed 100 per cent growth even though treated the same as the other samples, acted as a control for the p_H effect.

It can be deduced from this experiment that the presence of approximately 200 mg. of lactic acid per hundred cubic centimeters of heat sweat, plus the probable action of other fungicidal elements, can render even dilute alkalinized heat sweat fungicidal. This is not due to the p_H value produced by the addition of the lactic acid.

Experiment 7.—In the previous experiments sodium hydroxide was added to the sweat in order to preserve the volatile acids. This might have reduced the fungicidal power of the sweat by causing formation of sodium salts, which will be shown in later experiments to be less fungicidal than their corresponding acids. To avoid this possible reduction in the fungicidal power of the sweat the following experiment was made:

Perspiration was obtained by method 1 from a Negro, T. H., 14 years of age, who was suffering from cardiospasms. The sample was not alkalinized but filtered through a Seitz filter. A series of concentrations ranging from 10 to 90 per cent of the sweat in Sabouraud bouillon was made. T. gypseum was then inoculated in the usual way, as for the pellicle method. The initial p_H of the sweat was 8.3. The p_H of the 50 per cent concentration of sweat in Sabouraud bouillon was 6.05. The p_H of the 90 per cent concentration was 6.36.

Practically no growth took place in the 50 per cent concentration, and there was no growth in the higher concentrations. This shows that even dilute heat sweat may have fungicidal properties on the acid side (fig. 4).

Experiment 8.—The sweat obtained was probably a mixture of the secretion of the sweat glands, insensible perspiration and some sebum. In order to test the possible fungicidal power of the secretion of the sebaceous glands as compared with that of the sweat glands, two sebaceous cysts were removed from the scalp of a 45 year old white woman. The contents, carefully removed with sterile precautions, consisted of the usual rancid-smelling cheesy material. The contents of each cyst averaged about 3 Gm. of solid material. They were triturated separately with sand, and the resultant material was suspended in 10 cc. of saline solution. A series of tubes containing the suspended material from the sebaceous cysts and Sabouraud bouillon was set up. T. gypseum was inoculated according to the pellicle method.

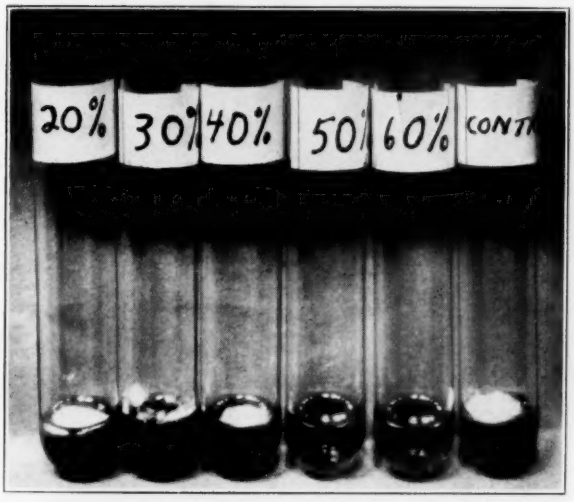

Fig. 4.—Heat sweat from a Negro boy was fungistatic in 50 per cent concentration and fungicidal in higher concentrations.

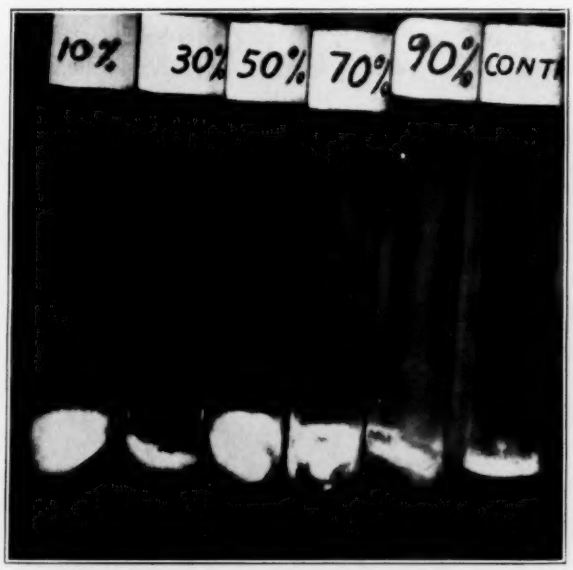

Fig. 5.—Contents of sebaceous cysts (sebum had neither fungistatic nor fungicidal power).

There was no retardation of growth of T. gypseum in any of the tubes, even in those with the greatest possible concentration under the experimental conditions—i. e., 30 per cent suspension of cystic material. Since we were dealing here with practically solid material, the marked difference in fungicidal power between sweat and sebum was striking (fig. 5).

RÉSUMÉ OF EXPERIMENTS WITH SWEAT

Alkalinized thermal sweat had no fungistatic property until concentrated.

Dilute heat sweat obtained from a Negro boy and not alkalinized was fungicidal at a p_H below 7.

Analysis of samples of sweat revealed the presence of propionic, acetic, caprylic (caproic) and ascorbic acids, as well as traces of urea and of uric acid.

Artificial sweat made according to our analysis and to those reported in the literature was fungicidal. The role of lactic acid in the fungicidal action of the sweat was demonstrated.

Sebum found in the contents of sebaceous cysts was neither fungistatic nor fungicidal.

FUNGICIDAL ACTION OF INDIVIDUAL CONSTITUENTS OF SWEAT

Since it has been demonstrated that sweat probably has fungicidal powers, we determined to study the action of its individual ingredients. Their fungicidal action on T. gypseum was investigated by the pellicle method.

The results of the experiments are summarized in table 1. A number of the substances listed in table 1 have been previously reported.[1] The

TABLE 1.—*Fungicidal Action of the Individual Constituents of Sweat on T. Gypseum (Pellicle Method; Two Weeks' Growth)*

Substance Studied	Concentration Required to Prevent Growth	p_H
Lactic acid	0.20	3.80
Sodium lactate	3.00	5.13
Citric acid	0.30	3.30
Ascorbic acid	0.30	3.80
Formic acid	0.03	4.30
Sodium formate	0.50	5.80
Acetic acid	0.05	4.80
Sodium acetate	5.00	6.70
Propionic acid	0.03	5.00
Sodium propionate	0.03	5.60
Butyric acid	0.01	5.30
Sodium butyrate	0.05	5.50
Caproic acid	0.009	5.50
Caprylic acid	0.03	5.50
Uric acid	Over 0.01*	....
Urea	5.00	6.20

* Insoluble in higher concentrations.

sodium salts of the lower fatty acids are included in the table because they were used for therapeutic purposes and because it was important to note the difference in fungistatic and fungicidal action between the salts and their corresponding acids.

It was also shown previously [1] that T. gypseum could grow to a slight extent in Sabouraud's bouillon at a p_H of 3.4 and grew well at a p_H range of from 4.4 to 10 when sodium hydroxide or hydrochloric acid was added to obtain the required hydrogen ion concentration. It is thus seen that, with the exception of citric acid, the fungicidal effect was not due to the hydrogen ion concentration produced by the addition of any substance to the medium.

The fungicidal effect of citric acid was due entirely to the low hydrogen ion concentration; ascorbic acid, however, had a definite fungistatic effect on the growth of T. gypseum and of E. inguinale, which was not due to the hydrogen ion concentration.[1]

The great difference in fungicidal effect between lactic acid and sodium lactate merits some attention. It was found that the fungicidal and fungistatic powers of racemic and of dextrorotatory sodium lactate were similar. We believe that the difference in the action of the sodium salt and the acid of any of these constituents of sweat is important, because it is possible that the acids might be converted into salts on the surface of the skin.

With the exception of sodium propionate and to a lesser extent of sodium butyrate sodium salts of all the acids studied were much less fungicidal than their corresponding acids. If there is a possibility that some of the volatile acids are converted into salts on the cutaneous surface, then the fungicidal action of the sweat should become greatly reduced after such a change, and correspondingly, alkaline sweat should be less fungicidal than acid sweat. Also, since the fungicidal power of sweat was tested after the substance had been alkalinized with sodium hydroxide, the actual fungistatic and fungicidal action of sweat was decreased by the conversion of some of the volatile fatty acids and the lactic acid into the sodium salts.

Comparison of the figures in table 1 with the figures furnished by analysis of sweat in previous experiments shows that even in dilute heat sweat lactic and caprylic acid are apparently present in sufficient concentration to be of practical importance as fungicides.

THE EFFECT OF THE p_H CONCENTRATION ON THE FUNGICIDAL ACTION OF SODIUM PROPIONATE

Sodium propionate was used therapeutically because it was the only salt of this series which was as fungicidal as its acid. In addition, its odor was much less objectionable than, for instance, that of sodium

butyrate. It was decided to study the effects of hydrogen ion concentration on the fungicidal properties of sodium propionate, because, theoretically, when this substance is applied to the surface of the skin, it might have to exert its therapeutic action over a wide range of hydrogen ion concentrations, depending on the p_H of the cutaneous surface at the site of the application.

A series of tubes of Sabouraud bouillon were treated with McIlvaine's buffers so that a p_H range of from 3 to 10 resulted. Sodium propionate was added so that a range of concentrations of from 0.05 to 0.45 per cent resulted. T. gypseum was inoculated into each tube as for the pellicle method.

Results.—The results of the experiment are summarized in table 2. It is apparent that sodium propionate is much more fungicidal on the acid side. A concentration of 0.05 per cent was fungicidal at a p_H of 4 and of 5. The fungicidal power of sodium propionate rapidly decreased above a p_H of 6. There was a marked difference in fungicidal power for the same concentration at a p_H of 6 and of 7. While at a p_H of 6 a concentration of 0.15 per cent completely inhibited growth of T. gypseum, a concentration of 0.35 per cent was necessary to achieve the same result at a p_H of 7.

TABLE 2.—*Fungicidal and Fungistatic Action of Sodium Propionate at Various p_H Values (Pellicle Method)*

Concentration, Percentage	p_H 3	p_H 4	p_H 5	p_H 6	p_H 7	p_H 8	p_H 9	p_H 10
0.45	0	0	0	0	0	0	0	0
0.35	0	0	0	0	0	±	+	0
0.25	0	0	0	0	±	±	+	0
0.15	0	0	0	0	+	±	+	0
0.05	0	0	0	+	+	+	+	0
Control McIlvane buffers	0	+	+++	++++	+	+	+	±

The question of the hydrogen ion concentration resulting from the topical application of sodium propionate was not considered in the clinical experiments, because the substance was used in a concentration above that which was fungicidal (0.45 per cent) in the whole p_H range studied.

CONCENTRATION REQUIRED TO KILL T. GYPSEUM, E. INGUINALE AND M. ALBICANS AFTER FIFTEEN MINUTES' EXPOSURE TO VARIOUS SALTS OF SOME OF THE ACIDS FOUND IN SWEAT

In evaluating the fungicidal powers of some of the substances found in sweat which might be used therapeutically, we thought it would

be of interest to determine how quickly the substances could kill fungi. Such a study might be of importance in determining the optimum concentration required for clinical use.

Method.—A series of concentrations of sodium acetate, sodium propionate, sodium butyrate and sodium lactate ranging from 1 to 9 per cent were made in physiologic solution of sodium chloride. To each tube, 0.1 cc. of a suspension of T. gypseum, E. inguinale or M. albicans in 10 × Sabouraud bouillon was added to make the final volume 1 cc. This was poured into the bottom of a Petri dish. After fifteen minutes, liquefied agar just before it hardened, was poured into the Petri dish and the dish rotated to obtain an even distribution. The amount of agar added (15 cc.) made the final dilution of the contained salt so great that it could be assumed that no further fungicidal or fungistatic effect was possible.

Results.—Table 3 summarizes the results of the experiment.

In a previous communication it was shown that the inhibiting effect of these salts on the growth of the fungi in solid mediums was not due

TABLE 3.—*Retardation (Percentage) of Growth of Pathogenic Fungi (Fifteen Minute Exposure) (Plate Method; Two Weeks' Growth)*

Percentage of Substance Tested	T. Gypseum				E. Inguinale				M. Albicans			
	Sodium Acetate	Sodium Propionate	Sodium Butyrate	Sodium Lactate	Sodium Acetate	Sodium Propionate	Sodium Butyrate	Sodium Lactate	Sodium Acetate	Sodium Propionate	Sodium Butyrate	Sodium Lactate
9.0	50	0	0	100	20	0	0	30	30	100	20	100
7.0	50	3	0	100	30	0	0	100	40	100	30	100
5.0	60	5	0	100	30	0	0	100	50	100	30	100
3.0	60	20	15	100	40	0	10	100	50	100	30	100
1.0	60	40	40	100	60	0	15	100	60	100	50	100
Control	100	100	100	100	100	100	100	100	100	100	100	100

to the p_H produced by their addition to that medium.[1] All the three organisms grew well on solid Sabouraud's medium at a p_H of from 4 to 10.

It can be seen from this experiment that sodium lactate, even in a concentration of 9 per cent, was completely ineffective as a fungicide. Sodium acetate also was a relatively weak fungicide under experimental conditions, as far as T. gypseum and E. inguinale were concerned. It was more selective, however, in its action on M. albicans, apparently having a greater fungistatic effect on this organism than sodium propionate, even though the latter substance was much more fungicidal than sodium acetate on T. gypseum and E. inguinale (fig. 6). Both in this experiment and in those previously reported [1] it was usual to find M. albicans much more resistant to the action of any of the fungicides tested than T. gypseum, which in turn was more resistant than E. inguinale. Sodium acetate was the only salt studied with which this order was varied.

To prevent completely the growth of M. albicans with sodium propionate it was necessary to expose the organism to a 10 per cent solution for at least one hour.

CLINICAL EXPERIMENTS

A series of patients with various types of fungous infection were treated with the following preparations:

	Parts
1. Sodium propionate	10
50 per cent alcohol, enough to make	100

	Parts
2. Sodium propionate	15
Venetian talc, enough to make	100

	Parts
3. Sodium propionate	15
Hydrous wool fat	40
Petrolatum, enough to make	100

	Parts
4. Propionic acid	0.01
Butyric acid	0.009
Caprylic acid	0.03
Lactic acid	0.09
Ascorbic acid	0.09
50 per cent alcohol, enough to make	100

The majority of the patients were treated with formulas 1, 2 and 3. It was found that in the presence of acute inflammatory lesions, especially with pustules and vesicles, formulas 1 and 2 gave satisfactory results. When the lesions were primarily scaly or eczematoid, an ointment (no. 3) gave better results. Many of the patients who were at first treated with formulas 1 and 2 finally had to be treated with no. 3 to eradicate residual scaling.

The applications of sodium propionate in alcoholic solution were made morning and evening, after which no. 2 was used as a dusting powder; in some instances it was more practical to use nos. 1 and 2 in the morning and no. 3 at night.

In order to evaluate properly the therapeutic efficacy of the ingredients of sweat, only the cases in which treatment was with the formulas given are reported. It was found that the addition of 2 per cent salicylic acid to formula 1 increases its efficacy and shortens the course

of the treatment. However, in some instances this addition produces irritation.

After an apparent cure had been obtained, patients were instructed to continue using formula 2 once a day and formula 1 twice a week as a prophylactic measure.

Treatment was given in many more cases than are reported here. Only those cases in which fungi could be demonstrated were chosen for inclusion in table 4.

Results.—It can be seen from table 4 that the therapy suggested gave fairly satisfactory results, especially when many of the patients in

Fig. 6.—The effect of sodium propionate on the growth of T. gypseum and of E. inguinale after an exposure of fifteen minutes to concentrations of 3 and 5 per cent of the salt. Upper row (T. gypseum): The plate on the extreme left in a control; the plate in the center is the growth after exposure to a 3 per cent concentration, and the plate on the right is the growth after exposure to a 5 per cent concentration. Lower row (E. inguinale): On the left is a control; in the center the growth after exposure to a 3 per cent concentration and on the right that after fifteen minutes' exposure to a 5 per cent concentration.

this series had been treated previously with other forms of therapy, including roentgen irradiation. Before a patient was considered healed, there had to be complete absence of objective and subjective symptoms. Since a number of the cases could be observed for only a short while after cure was apparent, it is not as yet possible to conclude anything

about the permanence of results. Patients were considered improved when subjective symptoms, such as itching or pain, had disappeared but clinical activity was still present, either at the primary site or in what were considered as "ids." Demonstration of fungi culturally or microscopically or a prompt recurrence of objective symptoms even with clinical improvement placed the patient in the "not improved" group.

More detailed analysis of table 4 reveals some interesting data. No patient with tinea capitis except the one with favus was influenced at all by the treatment. The patient with favus was not cured but showed clinical improvement.

TABLE 4.—*Summary of Therapeutic Results*

Diagnosis	No. of Cases	Demonstration of Fungi	Method of Treatment	Results of Therapy		
				Healed	Improved	Not Improved
Tinea capitis	2	Microsporon audouini	1, 2, 3, 4	..	..	2
	1	Microsporon lanosum	1, 2, 3, 4	..	..	1
	1	Favus	3	..	1(?)	..
Tinea versicolor	1	Microscopic evidence and history of infection	1	1	..	..
Tinea cruris	4	E. inguinale	1, 2	2	2	..
	2	E. inguinale	4	2	..	..
Epidermophytosis (feet) without "ids"	5	T. gypseum	1, 2, 2	2	2	1
	1	Trichophyton pluri-zoniforme	1, 2, 3	..	1	..
	6	Trichophyton purpureum	1, 2, 3	..	..	6
	8	Microscopic evidence	1, 2, 3	6	2	..
	2	Microscopic evidence	4	2	..	..
Epidermophytosis (feet) "ids" on hands	4	T. gypseum	1, 2, 3	3	1	..
	1	T. gypseum	4	1	..	..
	13	Microscopic evidence	1, 2, 3	5	7	1
Total.....	51			24	16	11

Patients with tinea cruris responded well. This result parallels the in vitro experiments with E. inguinale. Epidermophytosis due to Trichophyton purpureum did not respond to the treatment. It is well known that infections due to this organism are resistant to other forms of therapy as well.

If this last group is excluded, it can be seen that patients with and those without "ids" responded about equally well. It was of special interest to note how quickly symptoms of itching abated. No local irritation was noted; therefore the "ids" involuted rather quickly. The primary lesions responded slowly as a rule.

Although only a relatively small number of patients were treated with formula 4, it was our impression that the use of this mixture gave us the best results. Objective and subjective response was much faster, and as can be seen from table 4 the percentage of good results was

fairly high, compared with those following use of the first three. In eczema of nonfungous origin, especially in the groins and the axillas, this mixture was irritating, a fact which might be of use in the evaluation of the role of ingredients of sweat as irritants in the causation of eruptions in these areas.

In a few instances patients were treated by intramuscular injection of a 10 per cent solution of sodium propionate in physiologic solution of sodium chloride. It was found that when this solution was buffered to a p_H of 7 there was little pain after injection as compared with that produced by the nonbuffered solution. This form of medication was used in conjunction with topical applications in some instances. Although it seemed to help in some cases of resistant disease too few patients have been treated to warrant conclusions. The injections were made into the gluteal muscles in amounts of from 0.5 to 2 cc. A good result was especially noticeable in a patient with chronic folliculitis of the legs for whom previous therapy had proved ineffectual. To this patient injections alone were given, in doses of 2 cc. once or twice a week. It took several months before decided improvement was seen.

In a number of cases moniliasis with moniliids and also psoriasis were treated with injections of sodium propionate for a long time, without any effect on the course of the disease.

COMMENT

In the introduction we stated that one of the purposes of this communication was to attempt to determine the role of the sweat as a protective film for the cutaneous surface against infection and fungous diseases in particular. It has been suggested that the hydrogen ion concentration of the sweat as such is important in protecting the skin against infections.[6] Some investigators have even noted that areas of the skin with a more alkaline p_H were more prone to invasion by pathogenic fungi.[7] In addition, Cornbleet [8] from his experiments could

6. Marchionini, A.: Untersuchungen über die Wasserstoffionenkonzentration der Haut, Arch. f. Dermat. u. Syph. **158**:290-333, 1929. Marchionini, A., and Cerutti, P.: Untersuchungen über die Wasserstoffionenkonzentration des Schweisses bei Hautkrankheiten und deren Beziehung zur Alkalireserve des Blutes, ibid. **170**: 223-225, 1934.

7. Levin, O. L., and Silvers, S. H.: The Possible Explanation for the Localization of Ringworm Infection Between the Toes, Arch. Dermat. & Syph. **26**:466-470 (Sept.) 1932. Footnote 6.

8. Cornbleet, T.: Disorders of the Feet as the Cause of Resistant Eczematoid Ringworm: Influence on Amounts of Sweating of the Feet, Arch. Dermat. & Syph. **29**:887-889 (June) 1934; Self-Sterilizing Powers of the Skin: Are They Endowed by Surface Acid? ibid. **28**:526-531 (Oct.) 1933.

not support the hypothesis that self-sterilizing powers of the skin are due to the surface acids. It is evident from the experiments described in our paper that a more rational explanation can now be presented for the role of the hydrogen ion concentration of the sweat [9] in protecting the skin against infection.

It has been shown in a previous communication [1] that fungi are capable not only of growing over a wide range of p_H values but, like T. gypseum, of adjusting the hydrogen ion concentration under certain conditions to suit their needs. The low p_H of the sweat is due to its content of volatile fatty, lactic and ascorbic acids. These substances have been shown to have fungicidal properties which do not depend on the hydrogen ion concentration produced by their addition to culture mediums.

When sweat is unusually alkaline, either a decrease in the content of those acids or the formation of their salts (sodium, calcium or ammonium) is indicated. The latter condition may be due to the interaction of the acids with substances found on the surface of the skin, or the salts of the acids may be secreted as such by the sweat glands themselves. It is also possible that ammonia is formed by the action of bacteria on urea and epithelium. This substance reacting with the acids may form ammonium salts.[10] Since our experiments have shown that it is usual for the salts to be less fungicidal than their corresponding acids, we can understand the decreased fungicidal action of alkaline sweat.

It is firmly established in the minds of many dermatologists that hyperhidrosis is intimately connected with the predisposition to fungous infection, especially of the hands and feet. If this is so, how may it be reconciled with the proofs brought forward in our experiments that sweat has fungicidal powers?

Review of the work of Kuno,[11] Minor [12] and others who studied the distribution of sweat on the surface of the body by means of sweat prints furnishes a much clearer idea of the role of sweat in the localization of fungous infections. Figure 7, taken from Kuno,[11] shows the distribution of sweat in the axillas. It is known that common fungous infections, such as tinea versicolor are usually not found in the region

9. Usher, B.: Human Sweat as a Culture Medium for Bacteria, Arch. Dermat. & Syph. **18**:276-280 (Aug.) 1928. Sharlit, H., and Scheer, M.: The Hydrogen-Ion Concentration of the Surface of Healthy Intact Skin, ibid. **7**:592-598 (May) 1923.

10. McSwiney, B. A.: Composition of Human Perspiration, Proc. Roy. Soc. Med. **27**:839-848 (May) 1934.

11. Kuno, Y.: The Physiology of Human Perspiration, London, J. & A. Churchill, Ltd., 1934.

12. Minor, V.: Ein neues Verfahren zu der klinischen Untersuchung der Schweissabsonderung, Zentralbl. f. d. ges. Neurol. u. Psychiat. **47**:800-803, 1927.

of greatest concentration of sweat but attack the skin well outside this area. Here, too, the p_H cannot be playing a main role, since it has been noted by many investigators that axillary sweat, which is secreted by eccrine and apocrine glands, tends to be more alkaline than that on the other parts of the body. Compared with the incidence of fungous infection in the groin, where there is relatively little sweat, epidermophytosis of the axilla is rare indeed, especially the form localized in the center. It is true that erythrasma can be localized in the axilla. Since Microsporon minutissimum has never been cultured, we have no information on its resistance to the ingredients of sweat.

Fig. 7.—This illustration was taken from the monograph of Kuno. It shows the distribution of the sweat on the palms and soles, determined by the fuchsin method of Kosaka. The distribution of sweat in the axilla was taken from an illustration taken by the same author from the work of Kuo (reproduced by permission of the publishers).

The problem of the distribution of fungous infection on the hands and feet is of special interest and significance. Figure 7 illustrates the areas of most active secretion of sweat on the palms and soles. It has been pointed out that sweating on the palms and soles is continuous, and because of this insensible perspiration plays an important role in this region. It can be seen, therefore, that very dilute sweat is being dealt with. This dilution by insensible perspiration decreases the fungicidal properties of the substance. For this reason, it is not increased sweating which predisposes to fungous infections but increasingly dilute sweating.

Even with this possible explanation of the role of hyperhidrosis in fungous infection, the localization of fungous diseases on the palms and soles can still further be explained by the actual distribution of the sweat in these areas.

There is little actual sweat between the toes and in the clefts at the base of their flexor surfaces (fig. 7). The moisture present in these areas, which is probably mainly insensible perspiration, may cause maceration between the toes but has little fungicidal strength and thus forms an ideal situation for the development of fungi.

It seems to us that the arch of the foot, especially toward its inner aspect, is a favorite site for the localization of epidermophytosis. It can be seen from figure 7 that this area is relatively free from actual sweat. The distribution of epidermophytids, on the other hand, or of lesions free from fungi, whether on palms or soles, is seen irregularly scattered, irrespective of the distribution of the greatest concentration of sweat.

It is admitted that the hypothesis suggested concerning the relation of the distribution of sweat to the localization of primary fungous infection, i. e., epidermophytosis, has not been absolutely proved. The question is being investigated at present.

SUMMARY AND CONCLUSIONS

1. Thermal sweat may have fungistatic and fungicidal properties at a p_H below 7. Concentrated heat sweat is fungistatic even when alkalinized.

2. The fungicidal properties of sweat are due to its content of acetic, propionic, caproic, caprylic, lactic and ascorbic acid. These substances must be present in the proper concentration to exert a fungistatic or fungicidal effect.

3. There seems to be a relation between the localization of fungous infection and the distribution of sweat on the surface of the body. Areas which are exposed to the greatest concentration of sweat seem to have less tendency to fungous infection.

4. Sebum, as exemplified by the contents of a sebaceous cyst, could not be shown to be fungicidal or fungistatic.

5. Topical applications of ingredients of sweat, such as mixtures of lactic acid, propionic acid, butyric acid and ascorbic acid in proper concentrations, have proved valuable in the treatment of fungous infections.

This work was done with the technical assistance of Edward Weissbard.

ABSTRACT OF DISCUSSION

DR. J. GARDNER HOPKINS, New York: I should like to say how intensely interested I have been in this work of Dr. Peck and how much I admire it. I do not think anybody could make a study of fungous infection without realizing that the fungus is not all that produces the lesion; neither is the sensitization to the fungus. The variation in reaction probably has to do largely with sensitization, but I think that Dr. Peck has brought the first light dematologists have ever had on what may be the great difference in the susceptibility.

DR. LYLE B. KINGERY, Portland, Ore.: The more one observes the clinical manifestations in certain cases of dermatophytosis, the more one appreciates the inefficiency of present methods of treatment. For many years investigators have interested themselves in searching for a drug or chemical that would have a more specific-action and would be more universally effective than any now available. Drugs now used have marked fungicidal and fungistatic power, as indicated by laboratory studies. When applied to the skin they apparently combine as readily with the body tissues as they do with the organisms they are used to destroy. This fact would tend to explain, in part at least, certain weaknesses in present forms of therapy.

Another clinical observation seems suggestive to me: This is the frequent occurrence of ringworm infection of the scalp in the young and its rarity after puberty. Preliminary experiments with extracts of scalp hair from persons of varying ages have shown interesting results. It is possible that the adult scalp or hair contains substances toxic for the invading organism, or, conversely, that the scalp or hair of younger persons possesses a factor favorable to the growth of the organism.

Each of these observations suggests the need for a new approach to the whole question of the treatment of ringworm infections. In Dr. Peck's paper one such approach is suggested, and he is to be congratulated on the progress he has made.

DR. UDO J. WILE, Ann Arbor, Mich.: I should like to ask Dr. Peck whether the beneficial effects of roentgen rays in the treatment of acne may not, in fact, be due to the concentration of sweat resulting from irradiation. It seems to me that this would offer a plausible explanation for the remarkable results that can be achieved with radiation therapy of acne.

DR. DONALD M. PILLSBURY, Philadelphia: Some time ago Dr. James C. Andrews, of the department of physiologic chemistry at the University of Pennsylvania, made available to me a complete hydrolysate of human hair. I was interested in determining whether there was any element in human adults' hair which might suppress the growth of fungi in the scalp of children. Accordingly, ointments and lotions containing the hydrolysate were made up and used in a number of cases. They had no effect.

DR. GEORGE M. LEWIS, New York: Cure of fungous diseases is often difficult. In the cases in which Dr. Peck has found a response to his treatment, there has been often a tendency to self limitation. Such diseases also may resolve after mild topical applications. Perhaps Dr. Peck might state whether the cure of his patients was determined by the clinical findings or by culture. I should like to have his opinion regarding the reason for the lack of success with his treatment of fungous diseases hard to cure by other methods.

DR. JAMES H. MITCHELL, Chicago: As Dr. Peck has very carefully analyzed sweat, carrying the computations out to the fourth decimal place, I should like

to ask him as a matter of curiosity just what the odor is due to. If that could be determined, it might become of a great deal of importance in the solution of the question of what constitutes the pure Nordic type. If that could be reduced to a chemical basis, I think it would be of great international importance.

Havelock Ellis once stated that an East Indian servant was able after a large amount of family laundry had been done to identify by the sense of smell each member of the family and to separate their various garments. That required a very highly developed sense of smell, no doubt.

Clinical Notes

CONTACT ALLERGY TO COCKLEBUR (XANTHIUM SPINOSUM)

A Preliminary Report

ALBERT H. ROWE, M.D., OAKLAND, CALIF.

During the last three years I have observed a man aged 68 years who had typical dermatitis venenata in April, two years before I saw him. It started on the face, hands, arms and legs, spreading to a lesser degree over the entire body, gradually diminishing in the fall and winter. It reappeared on the exposed cutaneous areas the following April, with a fairly rapid generalized distribution, being especially severe in the hot months (July to October). When the patient came from his ranch in the Sacramento Valley near Chico to the San Francisco Bay area there was gradual and definite relief. Patch tests with the leaves of all trees, grasses, weeds, shrubs and cultivated flowers on his ranch produced a severe vesicular itching reaction to cocklebur, necessitating the removal of the patch in about four hours and requiring several weeks to heal entirely. A patch test with the moistened pollen of this plant (Xanthium spinosum) gave a less severe reaction. An acetone extract of the leaves yielded a severe vesicular reaction even when dried on the skin and not covered with adhesive tape. Cutaneous testing with all important pollen, animal emanation and miscellaneous allergens showed the following reactions: Lolium perenne, 1 plus; Amaranthus retroflexus, 1 plus; Chenopodium album, 1 plus; Atriplex patula, 1 plus; Artemesia californica, 4 plus; Artemesia vulgaris, 4 plus; chrysanthemum, 1 plus; acacia, 1 plus; Juglans, hindsii and Juglans regia, 3 plus; and Robina pseudocaccia, 2 plus. Perennial hyposensitization for two years with all reacting pollens and with that of cocklebur has delayed the onset of the dermatitis in the spring and has decreased its severity. Lack of relief from such treatment comparable with that obtained in my next-discussed case has indicated intramuscular injections of a 1 per cent oil of cocklebur leaves. Such injections are now being given, with the hope that dermatitis will be prevented thereby next season. The testing of groups of persons in different parts of the state where cocklebur exists in varying amounts indicates the infrequency of this type of contact allergy.

One other patient had recurrent dermatitis starting in the eyelids and involving the forehead, the face, the backs of the ears, the neck, the dorsa of the hands, the arms, the ankles, the lower parts of the legs, and the skin around the anus. It had been present for three years in July, August and September, occurring only in Kern County, Calif., especially in potato fields. The patient gave a severe vesicular patch reaction with the moistened pollen of Xanthium spinosum. A negative scratch reaction and a 3 plus intradermal reaction were obtained. Preseasonal and seasonal hyposensitization with the pollen extract of cocklebur for the last three years has entirely prevented the dermatitis except for a slight eruption around the eyes when the patient has been in the fields on hot days.

This preliminary report records cocklebur as a recognized cause of contact dermatitis in 2 patients. A more complete contribution on various phases of the problem, including the distribution of the various species of the weed, more complete case histories and a discussion of the therapy, is in preparation.

2940 Summit Street.

INCIDENCE OF EXTRAGENITAL CHANCRES

JOHN GODWIN DOWNING, M.D., BOSTON

A review of the records of the outpatient department of the Boston City Hospital for the years 1908 to 1930,[1] inclusive, showed 691 cases in which a diagnosis of primary syphilis was made; extragenital chancre was observed in 38 cases, approximately 6 per cent.

The location of these chancres is shown in the following tabulation:

	Male	Female	Percentage
Lip	13	15	73.6
Tonsil	2	0	5.3
Breast	0	2	5.3
Anus	1	0	2.6
Finger	1	1	5.3
Forehead	1	0	2.6
Chin	1	0	2.6
Ear	0	1	2.6
Total	19	19	

1. Downing, J. G.: Care of Syphilis in the Out-Patient Department of the Boston City Hospital, New England J. Med. **211**:349-353 (Aug. 23) 1934.

VARICELLA FOLLOWING EXPOSURE TO HERPES ZOSTER

Report of a Case

NAOMI M. KANOF, M.D., WASHINGTON, D. C., AND RUDOLF L. BAER, M.D., NEW YORK

Numerous reports have dealt with the possible etiologic relation between herpes zoster and varicella. Reviews of the literature on this subject will be found in modern textbooks, for example, Ormsby's.[1] The present report bears on this question, as it describes the striking chronologic sequence of herpes zoster in one member of a family and varicella in a second member.

REPORT OF CASE

Mr. E. G., aged 65, a resident of Havana, Cuba, first presented himself at the office of Dr. Marion B. Sulzberger on June 6, 1938, stating that he had had pain in the right lower quadrant of the abdomen for two days, followed by the appearance of groups of blisters in the painful area. Examination showed an eruption on the right side of the abdomen, the flank and the lower part of the back. This eruption had the typical unilateral beltlike distribution of herpes zoster and consisted of groups of papulovesicles, varying in size from that of a dime to that of a nickel, some of them with a surrounding zone of erythema. New lesions continued to appear until July 15, and on July 20 there were definite signs of involution.

During his illness the patient was nursed by his daughter, Mrs. C., who at that time shared living quarters with him. On July 20 Mrs. C., aged 32, noted a papulovesicular lesion on the abdomen. She had complained of general malaise, nausea and fever (temperature, 102 F.) during the preceding twenty-four hours. On July 21 many new discrete papulovesicles with surrounding erythema appeared, irregularly disseminated over the entire body. There were similar lesions of the oral and pharyngeal mucous membranes. The fever and malaise persisted for several days, and the clinical picture as well as the course of the illness were typical of varicella.

COMMENT

It is interesting to note that Mrs. C. may have escaped exposure to varicella during her childhood, since she had never gone to school with other children and had led a rather secluded life. Another interesting feature is the fact that a 6 year old previously unexposed child, son of Mrs. C., who was living in the same household, showed no clinical evidence of either varicella or herpes zoster.

1150 Connecticut Avenue.

962 Park Avenue.

1. Ormsby, O. S.: A Practical Treatise on Diseases of the Skin, Philadelphia, Lea & Febiger, 1937.

News and Comment

AMERICAN BOARD OF DERMATOLOGY AND SYPHILOLOGY

The next examination will be held in Philadelphia, in November 1939, near the time of the meeting of the American Academy of Dermatology and Syphilology, unless there are sufficient applications before February 15 to warrant an examination at the time of the meeting of the American Medical Association in St. Louis in May. Applicants desiring to take the examination in St. Louis must file applications with the secretary, Dr. C. Guy Lane, 416 Marlboro Street, Boston, not later than February 15.

An examination was held in St. Louis on November 11 and 12, 1938, at the time of the meeting of the American Academy of Dermatology and Syphilology. Thirty-five candidates were examined; twenty-four passed, eight were conditioned, and two failed. One candidate has not yet taken his written examination, so that a final report cannot be made.

The new diplomates of the board are as follows: Franklin I. Ball, Los Angeles; Burton F. Barney, Columbus, Ohio; Charles P. Bondurant, Oklahoma City; Mortimer J. Cantor, Brooklyn; William A. Clark, Houston, Texas; John E. Dalton, Indianapolis; John L. Fanning, Sacramento, Calif.; Paul D. Foster, Los Angeles; Julius E. Ginsberg, Chicago; Lawrence C. Goldberg, Cincinnati; Onis G. Hazel, Oklahoma City; Joseph J. Hecht, Pittsburgh; G. Warren Hyde, Detroit; Daniel J. Kindel, Cincinnati; Clement H. Marshall, Memphis, Tenn.; Walter F. Manley, Roanoke, Va.; Andrew H. Montgomery, New York; Minnie O. Perlstein, Chicago; Maurice J. Reuter, Milwaukee; Richard L. Saunders, Buffalo; Irving L. Schonberg, Cleveland; Jacob Skeer, Brooklyn; H. Earle Twining, Philadelphia; Norman M. Wrong, Toronto, Canada.

Dr. J. G. Hopkins, of New York, was elected a member of the board to fill the term of Dr. George M. MacKee, who has resigned.

Correspondence

TRICHOSTASIS SPINULOSA

To the Editor:—Inadequate search of the literature is responsible for an error in my brief paper "Trichostasis Spinulosa" (ARCH. DERMAT. & SYPH. **38**:363 [Oct.] 1938), in which the statement was made that the condition had not been reported to occur on the nose. This statement is refuted by an article of S. J. Fanburg (Trichostasis Spinulosa, ARCH. DERMAT. & SYPH. **27**:274 [Feb.] 1933). My apologies are offered to Dr. Fanburg and to any other authors to whom I have inadvertently failed to give credit. EDWARD F. CORSON, M.D., Philadelphia.

Abstracts from Current Literature

EDITED BY DR. HERBERT RATTNER

SCLEREMA NEONATORUM (SUBCUTANEOUS FAT NECROSIS). J. F. MCINTOSH, T. R. WAUGH and S. G. ROSS, Am. J. Dis. Child. **55**:112 (Jan.) 1938.

A case is reported and the literature reviewed. The authors conclude that the chief predisposing factor in sclerema, or subcutaneous fat necrosis, is the low olein content of the subcutaneous fat in the newborn child. The chief precipitating factor is believed to be obstetric trauma. The subcutaneous fats are altered in their physical aggregation, but not in their chemical state; they remain as triglycerides. No lipase capable of hydrolyzing body fats is present in sclerematous tissue.

PROGRESSIVE GENERALIZED (DIFFUSE) SCLERODERMA WITH SCLERODACTYLIA AND CALCINOSIS. D. J. PACHMAN, Am. J. Dis. Child. **55**:135 (Jan.) 1938.

A case of unusual probable generalized scleroderma with sclerodactylia and calcinosis is reported. There was severe emaciation, and ulcers were distributed unevenly over the entire body. The upper and lower extremities were drawn into acute flexion. Stumps were all that remained of the hands and feet. The scalp was hairless. The picture was very similar to that in C. M. Williams' case of diffuse scleroderma (ARCH. DERMAT. & SYPH. **9**:187 [Feb.] 1924).

NELSON PAUL ANDERSON, Los Angeles.

INFECTIOUSNESS OF SEMEN OF PATIENTS WITH LATE SYPHILIS. J. E. KEMP, Am. J. Syph., Gonor. & Ven. Dis. **22**:401 (July) 1938.

As a result of his experiments the author concludes that there is no adequate reason for persistence in the belief in the infectiousness of the semen of patients with late syphilis, since there is little evidence that any of the body fluids in this stage of the disease are frequently infectious.

SEROLOGIC REACTIONS AND IMMUNITY IN RELATION TO INFECTION AND TREATMENT OF SYPHILIS. J. A. KOLMER, Am. J. Syph., Gonor. & Ven. Dis. **22**:426 (July) 1938.

The author discusses at length and relates several animal experiments which permit him the following deductions regarding the serologic aspect of syphilis in relation to infection, immunity and treatment of the disease.

The acquired immunity to syphilis is apparently responsible for clinical latency in the disease, but cannot be relied on alone for maintaining this state indefinitely. This immunity apparently does not prevent reinfection in cured, or superinfection in uncured, syphilis of rabbits or man. Immunity is acquired only by infection and develops slowly. Treatment reduces the acquisition of immunity in early syphilis. The immunity apparently resides in the tissues, since the results of experiments with rabbits have revealed no humoral antibodies or evidences of phagocytosis. There is as yet no practical means for direct detection and measure of this acquired immunity in human syphilis.

The antibody or reagin concerned in the complement fixation reaction appears to be identical with that yielding positive flocculation reactions. The nature of the reagin is unknown except for its biologic nonspecificity in the sense of reacting

with lipoids in the tissues. This reagin is a product of infection with Spirochaeta pallida. It is not of itself spirocheticidal or spirochetistatic. Its persistence in chronic syphilis after one or two years of modern therapy indicates that sufficient immunity may be present in the tissues to protect the subject against progression or relapse of the syphilitic infection. The Wassermann antibody or reagin is produced not only in syphilis and yaws but in some cases of leprosy and malaria and possibly in trypanosomiasis and relapsing fever. In some cases of chronic latent syphilis in human beings the Wassermann reagin tends to disappear gradually and spontaneously after two years of thorough treatment. In cases of both early and chronic syphilis, including latent, benign and visceral infection, the author believes that persistently positive serologic reactions are not usually due to a hangover of reagin following biologic cure, but are evidence of persistent infection, frequently requiring periodic courses of follow-up therapy after an initial treatment of one to two years to guard further against clinical relapse or progression of the disease.

ROLE OF BIOPSY IN DIAGNOSIS OF VENEREAL DISEASES. E. R. PUND, R. B. GREENBLATT and G. B. HUIE, Am. J. Syph., Gonor. & Ven. Dis. **22**:495 (July) 1938.

The authors emphasize the value of biopsy as a means of diagnosis of many of the ulcerative lesions of the genitals, groin and perineum. Of 75 cases of ulcerative lesions of these regions, 21 (28 per cent) were complicated with other conditions. As antigenic and serologic tests do not always indicate the type of lesion, the value of biopsy is obvious. In the authors' series of cases fusospirochetosis was always a superimposed infection. The histologic differentiation of granuloma inguinale, lymphogranuloma venereum and chancroid is also given. A causal relationship with cancer is suggested.

REUTER, Milwaukee.

PRIMARY CARCINOMA OF TRACHEA WITH CUTANEOUS CARCINOMATOSIS. E. L. KEENEY, Bull. Johns Hopkins Hosp. **61**:411 (Dec.) 1937.

A case of carcinoma of the trachea with cutaneous metastases is reported. Because of the extreme rarity of cutaneous metastases in carcinoma of the lungs or bronchi, the author suggests that if such metastases occur in a case of tracheobronchial obstruction the primary growth is more likely to be located in the trachea than in the parenchyma of the lungs or the bronchi.

NELSON PAUL ANDERSON, Los Angeles.

TERTIARY SYPHILIS OF BREAST. H. G. ROSS, Canad. M. A. J. **38**:132 (Feb.) 1938.

In a review of the literature Ross was able to find less than 50 cases of late syphilitic lesions of the breast. The case which he reports is the first authentic case from the Montreal General Hospital. The condition was bilateral, ulcerative and sclerotic. The diagnosis was based on the histologic picture, a positive Wassermann reaction, exclusion of metastatic lesions elsewhere, healing under antisyphilitic therapy and observation of the patient for ten years.

URTICARIA. H. ORR, Canad. M. A. J. **38**:159 (Feb.) 1938.

Orr reviews the many causes of urticaria and stresses the necessity for an etiologic-therapeutic approach. Of 146 patients with urticaria, 95, or 65 per cent, had a low hydrochloric acid content when a fractional gastric analysis was made. Fifteen patients (10 per cent) were cured with hydrochloric acid alone, and many others derived benefit from its administration.

Pruritus Ani. J. T. Danis, Canad. M. A. J. **38**:265 (March) 1938.

According to Danis, when all known causative factors of pruritus ani had been investigated and their presence ruled out, the response to perianal injection of a 40 per cent solution of alcohol U. S. P. was satisfactory. Danis keeps his patients in the hospital for two weeks. This postoperative care is essential to prevent sloughing.

Pruritus Gingivae. L. P. Strean, Canad. M. A. J. **38**:362 (April) 1938.

Strean reports 5 instances of itchiness of the gums. In 4 of the 5 cases there was glycosuria, and the pruritus disappeared when a diabetic diet was instituted. In the fifth case the pruritus was due to sensitivity to a commercial tooth paste.

Report of Two Cases of Positive Wassermann Reaction in Ascitic Fluid. N. B. Gwyn, Canad. M. A. J. **38**:363 (April) 1938.

According to Gwyn, a positive Wassermann reaction of the ascitic fluid is a strong indication that hepatic damage is the result of gummatous infiltration. The analogy is drawn to examination of spinal fluid, and it is pointed out that the ascitic fluid may show a positive reaction when the blood has a negative reaction.

Central Retinochoroiditis in Congenital Syphilis. B. H. Harry, Canad. M. A. J. **38**:381 (April) 1938.

A boy aged 16 had been blind to a great extent for ten years. Symptoms of congenital syphilis included a positive Wassermann reaction, bossing of the frontal bones, Hutchinson teeth, arrested mentality, defective speech and spasticity of the right leg. Both eyegrounds showed central retinochoroiditis.

Kraurosis, Leukoplakia and Pruritus Vulvae: Treatment by Resection of Sensory Nerves of Perineum. B. Usher and A. D. Campbell, Canad. M. A. J. **38**:432 (May) 1938.

Usher and Campbell state that kraurosis vulvae, leukoplakia and pruritus with lichenification may be distinguished on clinical and pathologic grounds. All three conditions may be present in the same case. Excluding cases of malignant growth and actinodermatitis, and those in which psychoneurosis is suspected or other forms of therapy have failed, Usher and Campbell advise resection of the sensory nerves of the perineum. Immediate and permanent relief was obtained in a large percentage of cases. Regression of leukoplakia following the operation was noted in 1 case.

Venereal Disease in Relation to Pregnancy. J. C. Goodwin, Canad. M. A. J. **38**:447 (May) 1938.

Goodwin expresses agreement with other investigators that a pregnant woman tolerates antisyphilitic treatment as well or better than a nonpregnant one. Adequate treatment of the mother makes congenital and other fetal-placental syphilis preventable. The incidence of syphilis in pregnant women in the public obstetric ward of the Toronto General Hospital from 1932 to 1937, inclusive, was slightly less than 1 per cent. There has been a progressive decrease in the frequency of syphilis each year.

Use of Insulin in Urticaria. W. R. Caven, Canad. M. A. J. **38**:459 (May) 1938.

Caven obtained improvement following the administration of insulin in 2 cases of urticaria, in 1 of which there was proved allergy to food. The dose was from 5 to 8 units a day. The reason for the favorable effect was not known.

BURNS FROM IGNITION OF CELLULOID COMBS. HOWARD FOX, J. A. M. A. **109**:1978 (Dec. 11) 1937.

Fox warns against the danger of ignition when celluloid combs are used in setting the hair and the hair is dried by artificial heat. Samples of different varieties of combs were obtained from twenty different stores, and the majority were found to be made of celluloid, some of hard rubber and a few of metal. Sufficient warning of the danger inherent in the use of inflammable combs is not usually given to the buyer. Fox has observed 6 cases of severe burns from the ignition of celluloid combs in the past few years. In all cases the scalp was injured by third degree burn, causing scars and permanent loss of hair. In all but 1, burns were present on the body. The source of heat in these 6 cases was an electric lamp, a gas heater or a stove.

SEVERE DERMATITIS MEDICAMENTOSA FOLLOWING ADMINISTRATION OF SULFANILAMIDE. J. O. FINNEY, J. A. M. A. **109**:1982 (Dec. 11) 1937.

Finney reports the case of a man aged 29 who was given sulfanilamide in the treatment of gonorrheal prostatitis. On the sixth or seventh day of treatment severe itching occurred on the skin of the face, the arms and the chest. The drug was not immediately discontinued, and the symptoms increased. Edema of the face and of other parts was accompanied with a maculopapular rash on a considerable portion of the body. There was moderate elevation of temperature and a rapid pulse. Recovery was rapid after withdrawal of the drug and the employment of palliative measures.

FURTHER STUDIES WITH TUBERCULIN OINTMENT PATCH TEST. E. WOLFF and S. HURWITZ, J. A. M. A. **109**:2042 (Dec. 18) 1937.

A diagnostic test with tuberculin ointment was studied by Wolff and Hurwitz and compared with the Mantoux test. The ointment was prepared from regular tuberculin-glycerin broth, inoculated with human culture H 37. After four weeks' incubation, the cultures were sterilized and evaporated to one fifteenth of the original volume, the organisms being left in the material. A control ointment was prepared in the same manner without any organisms. The ointment test gave a positive result in every instance of active tuberculosis. In 1,075 observations there was 98.2 per cent agreement between the results of the ointment patch test and of the intracutaneous test with 0.1 mg. of old tuberculin. Discrepancies occurred only in cases of clinically latent disease. The ointment retains its potency for a period of at least four years.

CONTROL AND PREVENTION OF TRANSFUSION SYPHILIS. C. R. REIN, F. WISE and A. R. CUKERBAUM, J. A. M. A. **110**:13 (Jan. 1) 1938.

Rein, Wise and Cukerbaum are of the opinion that transfusion syphilis is more common than the few reported instances would indicate. In order to prevent its occurrence they advocate the control of donors under municipal supervision. Blood tests should be performed immediately prior to transfusion. The Kline flocculation test is considered the most desirable because of its ease and rapidity of performance, its adequate specificity and its high degree of sensitivity.

CHRONIC ROENTGEN AND RADIUM DERMATITIS: ANALYSIS OF 259 CASES. T. S. SAUNDERS and H. MONTGOMERY, J. A. M. A. **110**:23 (Jan. 1) 1938.

From a clinical study of 259 cases of chronic radium or roentgen injury to the skin, Saunders and Montgomery conclude that most of the injuries now occurring are due to the injudicious irradiation of various benign dermatoses. In 27 instances squamous cell epithelioma supervened. Epithelioma appears to develop with equal

frequency from keratoses and from ulceration. There is a definite and characteristic histologic picture in chronic radiodermatitis. Because of the tendency to malignant change, prompt and perhaps radical treatment of all lesions is urged.

NONSPECIFIC TREATMENT OF SYPHILIS. P. A. O'LEARY, J. A. M. A. **110**:42 (Jan. 1) 1938.

O'Leary states that nonspecific therapy, especially fever therapy, may be of value in the treatment of certain manifestations of syphilis when chemical therapy has failed. The specific drugs (arsphenamine and compounds of bismuth and of mercury) are still the outstanding ones for the treatment of early syphilis. The best results from nonspecific therapy are obtained in neurosyphilis, interstitial keratitis, resistant cutaneous and osseous lesions and occasionally relapsing early syphilis. No benefit need be expected in patients who have latent syphilis, cardiovascular, hepatic or gastric manifestations or late syphilis of the mucous membranes.

PROBLEM OF SERORESISTANT SYPHILIS: SO-CALLED WASSERMANN FASTNESS. J. E. MOORE and P. PADGET, J. A. M. A. **110**:96 (Jan. 8) 1938.

Seroresistant syphilis is classified by Moore and Padget as either early, when the infection is of less than two years' duration and the serologic test for syphilis remains positive after six months of continuous treatment, or late, when the infection has been present for over two years and the serologic test remains positive after the equivalent of a year of treatment. In cases of the first type the cerebrospinal fluid should be examined and suitable intensive and prolonged therapy administered. In cases of late syphilis the cerebrospinal fluid should be examined and a searching clinical study made, with particular reference to the cardiovascular system, the central nervous system and the osseous system. In the absence of abnormalities, treatment should be prolonged to a minimum of two years.

EPIDURAL HEMANGIOMA WITH COMPRESSION OF SPINAL CORD. L. M. JOHNSTON, J. A. M. A. **110**:119 (Jan. 8) 1938.

Johnston states: "The presence of a hemangioma in the dermatome below which there is sudden paralysis and sensory change should point to a diagnosis of intraspinal vascular anomaly." If diagnosis is prompt, complete cure may be effected.

CALCINOSIS CUTIS. M. E. PUSITZ, A. K. OWEN and G. A. FINNEY, J. A. M. A. **110**:360 (Jan. 29) 1938.

Pusitz, Owen and Finney were able to find prior reports of only 18 cases of calcinosis cutis. They studied 2 cases of the idiopathic variety, in 1 of which there was an appreciable elevation of the level of calcium in the blood. In both instances pain was a prominent symptom.

LEWIS, New York.

HERPETIC STOMATITIS. K. DODD, L. M. JOHNSTON and G. J. BUDDINGH, J. Pediat. **12**:95 (Jan.) 1938.

There has been great confusion in the literature, including pediatric textbooks, as to the status of stomatitis. This is a report of a bacteriologic study of 12 cases of stomatitis in a form identical with that described in most textbooks as aphthous stomatitis. Material from the lesions was inoculated into the corneas of 12 rabbits, and in each instance there was produced a purulent keratoconjunctivitis typical of herpes simplex. The infected corneas of 9 of the 12 rabbits showed typical intranuclear herpetic inclusions. Immunity to a known strain of herpes simplex was demonstrated in 6 of 7 rabbits which survived the infection. The authors conclude

that this type of stomatitis is a definite clinical entity with the virus simplex as the causative agent and should be designated as herpetic stomatitis. Since in most cases it occurs in children, it probably represents a primary herpetic infection.

RAUH, Cincinnati. [AM. J. DIS. CHILD.]

RECURRING MYXOMATOUS, CUTANEOUS CYSTS OF FINGERS AND TOES. R. E. GROSS, Surg., Gynec. & Obst. **65**:289 (Sept.) 1937.

The condition is uncommon. It is characterized by recurrent formation of a small myxomatous cyst of the skin of a finger or of a toe, not lined by a secretory epithelial membrane and not originating from an adjacent joint cavity, bursa or tendon sheath. The lesion is degenerative and is produced by a peculiar mucoid change in the connective tissue of the corium that goes on to liquefaction and formation of a cyst. The cause is unknown, but local trauma may play a role. The author records 22 examples, 8 of which he studied. In all but 1 instance the lesion was situated on a finger. These cysts varied in diameter from a few millimeters to slightly more than a centimeter. The site was commonly the dorsal aspect of a distal interphalangeal joint and usually a little to one side of the midline. The cysts were thin walled and contained a colorless glairy mucoid or gelatinous fluid. Three fourths of the subjects were women. The average age of the patients was 48 years. Such lesions are resistant to surgical forms of therapy, tending to recur again and again, but yield to irradiation with radium or roentgen rays. FROM AUTHOR'S SUMMARY. (WARREN C. HUNTER) [ARCH. PATH.]

CUTANEOUS AND SUBCUTANEOUS CALCINOSIS. F. R. B. ATKINSON and F. P. WEBER, Brit. J. Dermat. **50**:267 (June) 1938.

This article is a complete review of the literature dealing with cutaneous and subcutaneous calcinosis. All phases of the subject are considered: history, symptomatology, chemical nature of the deposits, metabolism, pathogenesis, associated conditions and treatment. The literature is brought down to date. It is a factual paper and a valuable reference work for any one interested in the subject.

CASE OF EHLERS-DANLOS SYNDROME. J. F. SMITH, Brit. J. Dermat. **50**:313 (June) 1938.

This is a report of a case of typical Ehlers-Danlos syndrome. Several cases have been reported recently in the British literature, and it would seem that the condition is not as rare as the scarcity of reports in the past would indicate. This case is well illustrated with photographs showing the papery scars and the tumor formation.

EPITHELIOMA ADENOIDES CYSTICUM. LOUIS SAVATARD, Brit. J. Dermat. **50**:333 (July) 1938.

In 1922 Savatard reported epithelioma adenoides cysticum in a family of 9, in which the mother, 3 daughters and a son were affected. He now reports on the present state of affairs of this family. In some the lesions have progressed and in others have remained stationary; 3 grandchildren are now affected. He reports briefly on another family group: a mother, 2 daughters, 4 granddaughters and one grandson, and on 4 other cases of the disease.

He concludes that contrary to general belief males are by no means infrequent sufferers. Hereditary influence is frequently marked; there was an instance in the fourth generation in one of his family groups. Onset may be during childhood or at puberty, but frequently occurs in early adult life and occasionally in middle age. Though the site of predilection is the middle third of the face, this area

may be relatively free. The brow, the sides of the face and the scalp or the scalp alone may be affected. On the trunk or on the scalp the lesions may attain rather large dimensions. As a rule, they are small and uniform, the size of a small pea. The course of the disease is variable. From his histologic studies Savatard concludes that turban tumor and benign cystic epithelioma are variants of the same condition. They are tumors of basal cell type originating from the surface epidermis or from the hair follicle.

FURTHER OBSERVATIONS ON DERMATITIS DUE TO CELERY IN VEGETABLE CANNING. S. A. HENRY, Brit. J. Dermat. **50**:342 (July) 1938.

The author observed dermatitis in 119 persons whose work was preparing celery for canning. From his study he concludes that the irritating factor is the oil of celery, containing limonene and its derivatives. In all the cases the disease occurred in the process of washing the celery. He suggests, among other measures, that mechanization of the washing process would do much to lower the incidence of this type of eruption. The paper is a statistical study and the process of canning celery is discussed in detail.

RECURRENT BULLOUS ERUPTION OF FEET. E. A. COCKAYNE, Brit. J. Dermat. **50**:358 (July) 1938.

The author describes 2 family groups with a peculiar bullous eruption, which occurred only on the feet and only during warm weather. The lesions appeared on the soles, heels and sides of the feet. The exciting cause seemed to be a combination of pressure and moisture, for trauma alone does not provoke formation of lesions. There was no scarring, no acrocyanosis and no hyperhidrosis; mucous membranes were not involved, and there were no epidermal cysts. In none of the cases was there dystrophy of the nails. The author concludes that the eruption in these cases is a conditional dominant.

RATTNER, Chicago.

SUCCESSFUL TRANSMISSION OF CUTANEOUS LEISHMANIASIS BY INOCULATION TO MAN FROM NATURAL LESION OCCURRING ON DOG IN INDIA. J. A. SINTON, Indian J. M. Research **25**:787 (Jan.) 1938.

A European volunteer was given cutaneous leishmaniasis by the inoculation of infected material obtained from a dog in India who had acquired the disease naturally.

The period of incubation of the lesion was over twelve months, and the nodule persisted for twenty months. Healing was spontaneous, without any therapeutic intervention.

The infection was transmitted by cutaneous scarification from the first to a second European volunteer, in whom the period of incubation was only five months.

LAYMON, Minneapolis.

ALOPECIA AREATA IN AN INFANT. C. M. WARREN, Proc. Roy. Soc. Med. **31**:84 (Dec.) 1937.

Alopecia areata was reported in a boy of 15 months. For nine months he had had two typical patches of it in the occipital region, where new growth of hair was already showing. The child's father, uncle, paternal grandmother and paternal greataunt had all suffered from alopecia areata at some time of life. Alopecia areata occurring in three generations appears to be rare, although the hereditary influence is definitely recognized.

WILLIAMSON, New Orleans. [AM. J. DIS. CHILD.]

TREATMENT OF GUTTATE MORPHEA BY INJECTIONS OF A BISMUTH PREPARATION. A. SÉZARY, Bull. Soc. franç. de dermat. et syph. **44**:1981 (Dec.) 1937.

The author reports 2 cases of guttate morphea in which remarkable improvement followed injections of a bismuth preparation after various other types of therapy had failed. The effect was ascribed to modifications of the biologic responses of the organism as a whole, comparable to the effect of bismuth therapy on lupus erythematosus.

REGRESSION OF EPITHELIOMA UNDER SOLE ACTION OF ANTISYPHILITIC TREATMENT. A. TOURAINE, Bull. Soc. franç. de dermat. et syph. **44**:1986 (Dec.) 1937.

The author reports a case in which ulcerated squamous cell epithelioma of the inner left canthus in a man aged 40 underwent complete involution under the sole action of energetic antisyphilitic therapy for two months. In the discussion of the case the question of pseudoepitheliomatous changes in a syphilitic lesion was brought up by Gougerot. Civatte, however, firmly maintained that in this instance the histologic picture left no question concerning the diagnosis of cancer.

DISTRIBUTION OF PRINCIPAL TYPES OF ANGIOMA. A. TOURAINE, Bull. Soc. franç. de dermat. et syph. **44**:2054 (Dec.) 1937.

The following conclusions were drawn from the study of 155 patients with 193 angiomas of diverse types:

1. With the exception of stellate angioma, which occurs with equal frequency in the two sexes, 70 per cent of angiomas occurred in female patients.

2. Angioma is rarely familial and shows no definite predilection for the first born.

3. In 75 per cent of cases the lesion was single.

4. Stellate angioma occurred most frequently on the face (nose and cheeks) and neck.

5. Flat angioma was located on the face and neck in 90 per cent of cases.

6. The most common locations for tuberous and cavernous angioma were the forehead, chest, cheeks and arms.

7. Association with other congenital dysplasias was relatively rare.

8. From an etiologic standpoint, heredity and traumatism seemed negligible factors. Twenty-five per cent of the patients had prenatal syphilis.

SPECIFICITY OF FREI TEST. LOE PING KIAN, Bull. Soc. franç. de dermat. et syph. **44**:2079 (Dec.) 1937.

The author tested 230 children aged 6 to 15 who showed no signs of lymphogranuloma venereum. Of 400 Frei tests given to this group, only 2.5 per cent gave doubtful positive reactions and 97.5 per cent negative results, emphasizing the specificity of the Frei test.

LAYMON, Minneapolis.

CLINICAL AND ANATOMIC FORMS OF VULVAR ESTHIOMENE AND OF ANORECTOGENITAL SYNDROME: THEIR RELATION TO LYMPHOGRANULOMA VENEREUM. J. J. PUENTE, Rev. méd. latino-am. **23**:367 (Jan.) 1938.

The author has made a historical study and presents 4 cases from his own experience, in women between 30 and 36 years old. All gave positive reactions to the Frei test, and 2 had old latent syphilis in addition. The Ito-Reenstierna and the autoinoculation test gave negative results. The most common clinical forms observed were elephantiasis of the vulva with indolent ulcerations, anoproctitis, rectal stenosis and perianal fistula. One patient was examined by a gyne-

cologist about two weeks after exposure to a man with inguinal lymphadenopathy; at this time an erosive lesion of the cervix was discovered, but all tests gave negative results. Some three weeks after this examination the cervical lesion disappeared, and the patient presented unilateral inguinal lymphadenopathy and an edematous ulcer near the meatus; at this time the Frei reaction was found to be positive and the Wassermann reaction of the blood negative.

The author describes a most remarkable and probably unique case, in which there existed vulvar elephantiasis and ulcerations and stenosing proctitis, and for three years a rectovaginal fistula had been present. In the terminal phase the clinical syndrome of lipoid nephrosis developed. At autopsy the clinical diagnosis was corroborated, but in addition an infiltration and incomplete stricture of the terminal ileum, which had the same histologic structure as the rectal stricture, was observed.

There is appended an excellent group of photographs of the clinical material and complete histologic data with photomicrographs. LEIFER, New York.

MENINGEAL REACTIONS IN CHILDREN WITH ERYTHEMA NODOSUM. I. MÓRITZ, Orvosi hetil. **81**:677 (June 26) 1937.

Móritz states that clinical signs of meningeal irritation are often found in children with erythema nodosum without any alterations of the cerebrospinal fluid except perhaps increase in pressure. During experiments with the allergometric procedure of Groer, after intracutaneous injections of tuberculin he observed meningeal symptoms in 3 children; these disappeared in a few days. He considers that these symptoms were due to hyperemia caused by tuberculotoxic allergy.

GÖTTCHE, Budapest, Hungary. [AM. J. DIS. CHILD.]

THREE CASES OF JARISCH-HERXHEIMER PHENOMENON IN AREA OF PRIMARY SCLEROSIS. M. KOHNO, Lues: Bull. Soc. japon. de syph. **16**:102 (Dec.) 1937.

The author has observed the appearance of pain in the lesion and in the inguinal region, associated with increase in the erythema, induration and secretion of the lesion, following intravenous injection in 2 cases of primary syphilis of 0.45 Gm. and in a third case of 0.9 Gm. of sodium arsphenamine. Chills, fever and general malaise were present in 1 case. The local irritation disappeared within a week, in spite of continued administration of arsphenamine and of a mercurial preparation. The author considers these symptoms as probably manifestations of the Jarisch-Herxheimer phenomenon. BLOOM, New York.

Society Transactions

CLEVELAND DERMATOLOGICAL SOCIETY

CLAUDE BAZIL NORRIS, M.D., *President*

March 24, 1938

C. L. CUMMER, M.D., *Secretary*

J. R. DRIVER, M.D., *Reporter*

Syphilitic Juxta-Articular Nodules; Syphilitic Bursitis of Verneuil; Atrophic Arthritis. Presented by DR. W. F. SCHWARTZ (from the Department of Dermatology and Syphilology, City Hospital).

C. W., a woman aged 68, states that there have been nodules on the extensor surfaces of both forearms and swelling of both knees for the past nine or ten years. In 1929 the patient was in the City Hospital because of atrophic arthritis; at that time the nodules on the forearms and grapefruit-sized fluctuant painless swellings above and medial to each patella were described. (The swelling on the left knee has almost disappeared, whereas the right has remained about the same.) Within the past year nodules have appeared on the ball of each foot.

On the anteromedial aspect of the lower part of the right thigh, just above the knee, there is a grapefruit-sized soft painless swelling. There is no swelling on the left knee, however. On the extensor surface of the upper part of each forearm are four or five firm painless discrete subcutaneous nodules measuring up to 1 cm. in diameter. The overlying skin is slightly bluish red and is not definitely attached to the nodules. Over the tip of each elbow is a soft 2 to 3 cm. subcutaneous tumor, without discoloration of the skin; on careful palpation a few tiny firm nodules can be felt in these tumors. Just under the skin on the extensor surface of the first joint of each middle finger is a 3 to 5 mm. firm nodule. On the ball of the right foot there are three, and on the left two, firm deep subcutaneous nodules. These are ranged side by side and have only a normal amount of hyperkeratosis on the surface.

The mucous membranes appear normal. There is no demonstrable evidence of cardiovascular or neural syphilis. The urine showed albumin (2 plus) but no sugar or Bence Jones protein. Chemical analysis of the blood showed sugar, uric acid, cholesterol, albumin and globulin and total proteins (serum) in essentially normal amounts. The Wassermann reaction was negative in 1929 and on Feb. 8 and Feb. 15, 1938. The Kline reaction was 4 plus on Feb. 8 and on Feb. 15, 1938, but negative on March 15. The spinal fluid was entirely normal.

Aspiration of the mass on the right knee on Feb. 22, 1938, showed fibrin and a few polymorphonuclear leukocytes.

Biopsy of the forearm was done in 1929 and in 1938. Histologic examination showed the epidermis to be unchanged. A few of the blood vessels had thickened endothelium, and a perivascular infiltration of lymphocytes appeared. No plasma cells were seen. There was an enormous amount of homogeneous material which was acidophilic and gave a positive reaction to the azan stain; this was probably collagen. Stains for amyloid gave inconclusive results.

DISCUSSION

DR. G. W. BINKLEY: I agree with the diagnosis as presented.

DR. H. G. MISKJIAN: I should like to know whether this condition is Charcot's disease.

DR. W. F. SCHWARTZ: I do not believe it is Charcot's disease. There are no other signs of tabes dorsalis, and the spinal fluid is normal. No characteristic destructive changes in the bone are shown roentgenologically. The only changes shown are widening of the articular spaces and lipping, in other joints, associated with atrophic arthritis.

DR. E. J. ARDAY, Lakewood, Ohio (by invitation): From my understanding, these nodes are extremely rare. Andrews published a picture in his textbook, and Stokes mentioned the disease in fine print. I observed a case in my own practice just three weeks ago. The diagnosis at that time was fibroma and that in another case lipoma. The lesions were disappearing rapidly under antisyphilitic therapy.

DR. J. R. DRIVER: It would be interesting to perform a Wassermann test with fluid aspirated from the knee.

DR. W. F. SCHWARTZ: One thing will establish the diagnosis: the effect of therapy. Both these conditions respond well to therapy. The patient has had no treatment.

Leukoderma Acquisitum Centrifugum. Presented by DR. E. W. NETHERTON and DR. GEORGE HASKEL CURTIS (by invitation).

H. A., aged 20, in December 1936 had a pigmented hairy mole removed by electrolysis from the right side of the face, just anterior to the ear. A few months later an area of depigmentation developed around the scar. Since then he has noticed numerous areas of depigmentation scattered over the body. Small areas of canities have recently developed on the scalp and in the pubic region.

Numerous small pigmented nevi are scattered over the body. Some contain hair; others are hairless. Many are surrounded by a zone of leukoderma. There are also areas of leukoderma in which a central nevus cannot be seen. There is a scar on the right side of the face, just in front of the ear. This has a zone of leukoderma around it. There is an area of canities on the right side of the scalp. In the center of the tuft there is a pigmented mole, surrounded by an area of depigmentation.

DISCUSSION

DR. CLAUDE BAZIL NORRIS, Youngstown, Ohio: I have observed 3 or 4 cases in the last two or three years. The patients were all young people. One was a girl about 13 or 14, and the condition caused a great deal of distress to the family because of the cosmetic effect.

DR. E. W. NETHERTON: I noticed no pigmentary changes until the pigmented mole was removed from his face, and when the leukoderma appeared it was around the area where the mole had been removed. Since then other lesions—rather numerous—have developed. Clinically there is no hyperpigmentation around the zone of deep pigmentation. In true vitiligo there should be some hyperpigmentation. It is unusually absent in this disease. Another thing is that there are no chromatophores, which are always present in true vitiligo. Histologic examination has been reported to show nothing but loss of pigment.

Secondary Syphilis with Synovitis of Knees, Deafness and Hoarseness. Presented by DR. W. F. SCHWARTZ (from the Department of Dermatology and Syphilology, City Hospital).

W. S., a man aged 32, states that in October 1937, seven weeks after a suspicious sexual contact, a penile sore with edema of the prepuce developed. In January 1938 ulcers appeared in the mouth and about the anus. Shortly after this a generalized eruption was noticed. One week later, three weeks before he was admitted to the hospital, he began to notice hoarseness and deafness.

At the time of admission mucous patches were found in the mouth and about the anus, and the larynx showed congestion throughout, with thickening of the

vocal cords. Hearing tests revealed partial middle ear deafness, which was thought to be due to chronic otitis media. There was questionable involvement of the eighth nerve. A generalized papular syphiloderm was present.

Soon after the beginning of antisyphilitic therapy the hoarseness and deafness disappeared, but after four injections of a soluble bismuth preparation and five injections of mapharsen, bilateral, somewhat painful hydroarthrosis of both knees appeared. There was no local heat or limitation of motion, and the patient remained afebrile.

On two occasions the Wassermann reaction was 4 plus. Dark field examination of material from mucous patches showed Spirochaeta pallida. The spinal fluid was normal. Fifty cubic centimeters of straw-colored fluid aspirated from the knee on March 4, 1938, showed a 4 plus Pandy and a 4 plus Wassermann reaction and 950 cells, 77 per cent of which were polymorphonuclears and 23 per cent lymphocytes.

DISCUSSION

DR. W. F. SCHWARTZ: The unusual thing here is that synovitis of the knees developed after the patient was given treatment. The deafness, hoarseness and lesions on the skin and in the mouth had all cleared considerably by the time the synovitis developed. The patient was afebrile, and pain was not a constant factor, in contrast to patients with gonorrheal arthritis, who usually have a high temperature and pain.

Bromoderma. Presented by DR. GARRETT ARTHUR COOPER (from the Department of Dermatology and Syphilology, Lakeside Hospital).

M. K., a woman aged 43, shortly after the cessation of the menses became increasingly nervous. In April 1937 she began to take a "pink salty medicine" for her nerves. In June of the same year she began to experience "breaking out" on the legs and feet. After irritation of one of these lesions there was an ulcerated area on the left leg. This was treated for eleven months, without relief. Later several smaller areas developed on her legs.

On the lower part of the left leg is a fungating ulcer about 5 by 8 cm. Posteriorly and higher there is a similar, smaller lesion, and on the abdomen are several red papules.

The Kline exclusion test for syphilis was negative.

Treatment consisted of continuous gastric drainage, as recommended by O. E. Toenhart (*Wisconsin M. J.* **34**:901 [Dec.] 1935), oral administration of sodium chloride and clysis. Before treatment, analysis of the urine showed 2.4 mg. of bromide per hundred cubic centimeters. Reexamination three days later showed 1.8 mg.

DISCUSSION

DR. GARRETT ARTHUR COOPER: I wanted to demonstrate a technic for eliminating bromides by gastric lavage. Bromides enter the stomach, react to the hydrochloric acid and form hydrobromic acid. The only bromides eliminated normally pass through the urine. As a means of speeding elimination drainage of the stomach was used. Toenhart used the treatment in several cases of psychosis. In 1 case reported there was 300 mg. of bromide, and in less than six days the author was able to reduce the content to less than 100 mg. per hundred cubic centimeters. In the present case the Wangensteen type of drainage was used. A tube is put down through the nose and hooked up so that aspiration is constant. The patient is not allowed to take anything by mouth. I wanted to demonstrate this merely as a check on the efficacy of the treatment. I do not think the drainage is particularly necessary, but it might be of help in a more critical condition.

DR. R. E. BARNEY: I think a warning note should be sounded about the intravenous injection of saline. One should not start with too large a dose, which may throw the patient into shock, especially if constitutional symptoms are present.

I think I should start with about 50 cc. of the regular type of physiologic solution of sodium chloride and increase the dose gradually. I should not start with 300 or 400 cc., as has sometimes been recommended.

DR. E. W. NETHERTON: I have observed a number of cases of a condition like this over a period of years. One striking thing not emphasized in the average textbook is that these lesions are painful. Sometimes the patients have difficulty in walking, even though the lesion may be just above the ankle. Wile has suggested that the giving of too large a dose of saline in these conditions might produce nephritis. I start usually with 100 cc. and gradually increase the dose, and I have never had any trouble. The lesions respond favorably and quickly. I think Dr. Barney's warning should be emphasized.

Tuberculosis Verrucosa Cutis of Perineum; Fistula in Ano (Tuberculosis); Pulmonary Tuberculosis. Presented by DR. W. F. SCHWARTZ (from the Department of Dermatology and Syphilology, City Hospital).

M. F., a man aged 25, states that he had a perirectal abscess two years ago; this was incised, with resulting draining sinuses. Four months ago another abscess developed, which also necessitated incision and drainage. Shortly after the operation the patient noticed the present eruption on the perineum.

Three weeks ago, before treatment was started, there was a well demarcated elevated moist red granulomatous process extending from the anus anteriorly over the perineum and down onto the posterior portion of the scrotum, where the margins gradually became less distinct. Just to the right of the anus was a fistulous opening with exuding pus. Since irradiation was started, the lesion has become more dry and has resolved to some extent.

Roentgen examination of the chest showed moderately dense nodular mottling in both apical and subapical regions, without evidence of ulceration. The disease was predominantly proliferative.

The sputum showed no acid-fast bacilli. The urine was normal. The Kline exclusion test was negative.

Microscopic sections showed the epithelium to be included in only a few portions, but moderate acanthosis appeared to be present. Both in the deep and in the superficial part of the corium there was a more or less diffuse granulomatous infiltrate. A few tubercles were seen. Numerous giant cells were noted, and there were irregular areas of early necrosis.

Unfiltered roentgen radiation, three doses of 200 r every two days, was applied.

DISCUSSION

DR. R. E. BARNEY: I cannot convince myself that this patient presents the clinical picture of tuberculosis verrucosa cutis. I can accept the diagnosis of fistula in ano, however.

DR. H. G. MISKJIAN: I was waiting for some one else to make that remark, and I think physicians should be careful about the words they use. There is little verrucous character to the lesion. It is a tuberculous ulceration secondary to pulmonary tuberculosis, just like the tuberculous ulcers on the tongue of a patient who expectorates tubercle bacilli. Bacilli he swallows will produce tuberculosis of the anal region in the same way.

DR. R. E. BARNEY: I believe this fistula is secondary to a tuberculous abscess. It enters higher up and breaks outside. That would be my conception of the development of this fistula in ano.

DR. W. F. SCHWARTZ: Apologies are in order here, as I could not present the patient in his original condition. This process has resolved at least 50 per cent in the past three weeks. Previously the lesions were well delineated, and there was a moist granular red surface. I could not elicit the exuding point of pus, but there was definitely a granuloma at that time. It is known that tuberculosis verrucosa cutis is the result of external inoculation with the organism. Of course

it occurs on the back of the hand commonly, but it seems to me that the same thing has happened in this location. His sputum has shown no organisms at any time.

Lymphocytic Leukaemia Cutis. Presented by Dr. John E. Rauschkolb and Dr. Hal Elson Freeman.

O. T., a man aged 48, in January 1937 noticed a small reddened area on the flexor surface of the left arm. This increased in size in spite of therapy, and generalized lymphadenopathy became marked, especially in the groins. Almost all of his hair has been lost.

In the past two weeks there has been marked anorexia and loss of weight. He has felt worse than at any previous time.

The skin of the entire body is erythematous and desquamating. Diffusely scattered over the accessible portions of the body are excoriated areas, some of which show slight secondary infections, resulting in moderately severe secondary infectious dermatitis of the perianal and the perineal region. The spleen and liver are not enlarged.

The temperature has been from 38 to 38.5 C. (100.4 to 101.1 F.) on the average. The pulse rate and the respiration are normal. The blood pressure is 130 systolic and 90 diastolic. The tongue is smooth, erythematous, deeply furrowed and not coated.

The urine is normal. There are from 12,000 to 13,000 leukocytes and from 4,450,000 to 4,300,000 erythrocytes. The hemoglobin was 84 and 75 per cent on two determinations. The differential count showed 40, 55 and 56 per cent polymorphonuclears, 50, 35 and 28 per cent lymphocytes, 2, 1 and 4 per cent monocytes and 8, 9 and 11 per cent eosinophils. The icteric index was 6. Examination of the stool on March 10, 1938, showed occult blood. Roentgen examination of the chest showed no abnormality.

Biopsy showed a dense infiltration of lymphoid cells in the corium consistent with the clinical diagnosis of leukaemia cutis.

Treatment consisted of roentgen therapy and topical applications.

DISCUSSION

Dr. R. E. Barney: As I understand it, this patient has had roentgen therapy. If he has, that would account for the difference in the lymphocyte count. I might add that I think the patient's spleen is definitely enlarged, in addition to the generalized adenopathy. I should classify the condition as subleukemic lymphadenosis.

Dr. John E. Rauschkolb: This case was presented at the April 1937 meeting, but we decided not to publish the report because no biopsy had been done and because we wanted to present it again more completely. After this the patient was admitted to Lakeside Hospital and the case worked up. At that time I performed a cutaneous biopsy. The only relevant evidence, as far as the biopsy was concerned, was of definite infiltration, typical of lymphatic leukemia of the skin. Sternal puncture produced practically no relevant evidence and biopsy of a gland none. We could not palpate the spleen. The blood has changed somewhat. The white cell count is about the same now as it was a year ago, but the number of lymphocytes has decreased. The man has had generalized and localized irradiation of the long bones and of the splenic area, but his condition has gradually gone downhill. The generalized adenopathy is more pronounced than it was a year ago. I think most of the glandular enlargement is due to secondary cutaneous pyoderma.

Elephantiasis of Penis and Scrotum; Congenital Hemolytic Jaundice; Cirrhosis of Liver. Presented by Dr. E. W. Netherton and Dr. George Haskel Curtis (by invitation).

M. A., a man aged 60, had typhoid fever thirty years ago and malaria thirty-eight years ago.

Forty-five years ago he had a sore on his penis, which was cauterized and which healed in two weeks. At the same time a right inguinal bubo developed, suppurated and then healed. There is no history of syphilis, and he never has had antisyphilitic treatment. During the Spanish-American War he contracted malaria and jaundice at Manila, Philippine Islands. Since then he has had chills and fever lasting a few days about once a year. The last attack was one year ago. He first noticed thickening and slight itching of the scrotum eight or nine years ago. Seven years ago, within twenty-four hours after he had lifted a heavy object, the penis and scrotum suddenly became enormously swollen. There have been no subjective symptoms. The parts slowly receded to about half the previous size. The patient has not had any urinary difficulty. Since the onset of the disease he has been impotent. Several Wassermann tests gave negative reactions. He was a chronic alcoholic addict up to six or eight months ago, consuming one-half pint or more of alcoholic liquor a day for many years.

There are slight impairment of hearing, a yellowish tint of the scleras, carious and dirty teeth, gingivitis and a moderately enlarged prostate. Roentgen examination of the chest, the gastrointestinal tract and the kidneys showed no abnormality. The scrotum is greatly enlarged and thickened.

The skin and dartos are estimated to be ¾ inch (2 cm.) thick; the surface is hard, with slight pitting under strong pressure. The cutaneous markings are greatly exaggerated, giving the impression of a verrucous surface, and the dependent parts are dull bluish red. The skin of the shaft and the prepuce is correspondingly enlarged and thickened. Palpation of the testicles shows them to be of apparently normal size. There is a scar in the right groin.

A blood count showed 4,510,000 erythrocytes, 9,700 leukocytes, 81 per cent hemoglobin, 72 per cent neutrophils, 15 per cent lymphocytes, 6 per cent eosinophils, 6 per cent monocytes and 1 per cent basophils. The sedimentation rate was 0.76 mm. per minute. The icteric index was 20. The red blood cell fragility test showed beginning hemolysis in a solution of 0.55 per cent and complete hemolysis in one of 0.38 per cent. There were 0.8 per cent reticulocytes and 5.3 Gm. of serum protein (4.1 Gm. of albumin and 1.2 Gm. of globulin). The Wassermann and the Kahn test were negative. Repeated examinations for Filaria and Plasmodium gave negative results. The basal metabolic rate was +9 per cent. The Takata-Ara test gave a negative result. The bromsulphalein test of hepatic function showed 11 per cent retention after five minutes and 20 per cent retention after thirty minutes. The Frei test gave a positive result. There was a faint trace of albumin. The spinal fluid was normal.

Microscopic sections from the scrotum showed enormous proliferation of connective tissue. There was some spongiosis in an otherwise normal epidermis. The papillae and the corium showed moderate perivascular edema and a slight diffuse round cell infiltration, with an occasional cell invading the epidermis. Deep in the section there were a few islands of densely packed round cells in the septums of the blood vessels. Large bundles of connective tissue separated the bundles of smooth muscle, the latter being markedly edematous and appearing intracellular on cross section. Throughout the connective tissue were areas of more or less localized edema. Perivascular edema was consistently present throughout. The sebaceous and coil glands appeared normal.

Antisyphilitic therapy did not affect the elephantiasis.

DISCUSSION

DR. E. W. NETHERTON: Some time ago I had a patient with elephantiasis of the lower lip. At the same time he had a late nodular syphilid on his arm. I called the elephantiasis of the lip syphilitic. The lesions on the arm, about the nature of which there was no question, disappeared under treatment, but the lip remained unchanged. I remember having seen 2 other patients whose scrotum and penis were involved. They were not suffering from tabes dorsalis.

This patient had a penile lesion years ago, which lasted only a short time. Adenitis developed and the glands broke down and drained. Edema of the genitalia then developed; for no apparent reason this condition suddenly became marked. It disappeared, but reappeared the next day and has remained as it is at present. We have been unable to establish a diagnosis of syphilis. The question whether there might be associated lymphogranuloma venereum, somewhat akin to elephantiasis of the vulva, came up. The Frei reaction was definitely positive. Stokes wrote a short paragraph on this condition. One sees syphilitic elephantiasis mentioned in the literature, but I can get little definite information in regard to it.

DR. GEORGE HASKEL CURTIS (by invitation): Exclusive of filariasis, elephantiasis of various parts of the body, both congenital and acquired, has been reported in the literature in a great many cases. In relation to this case, the congenital type need not be discussed. Among the various etiologic factors of the acquired type, syphilis has been associated or thought to be the cause of elephantiasis of the lips, ears, nose, upper or lower extremities and external genitalia. Tuberculosis itself or with secondary infection may bring about hypertrophy of the vulvoperineal region. I have not observed a case of elephantiasis of the penis or scrotum associated with tuberculosis except after dissection of the inguinal lymphatic vessels. Nocardiosis has been reported to produce elephantiasis of the vulva. Gonorrhea, its sequelae and chancroid have preceded elephantiasis of the penis or of the penis and scrotum. Extirpation of the inguinal lymphatic vessels for buboes, chronic ulcerations, granuloma inguinale, lymphogranuloma venereum and other forms of mechanical blockage of the lymphatic vessels has resulted in temporary or permanent elephantiasis of the external genitalia. Leprosy, varicose ulcerations and secondary bacterial invasions also have been known to result in localized elephantiasis. Elephantiasis nostras is conceded to be a specific bacterial infection which usually involves the lower and occasionally the upper extremities. Up to the present time I have found only 2 reported cases of elephantiasis of the penis and scrotum associated with lymphogranuloma venereum, 1 of which was reported by G. V. Stryker and B. Ploch (ARCH. DERMAT. & SYPH. **32**:86 [July] 1935) in this country.

I have found only 5 reports of elephantiasis of the penis and scrotum associated with syphilis that was entirely cured—that is to say, reduced to normal size—by antisyphilitic therapy. Four of the cases were reported in the French literature from 1915 to 1917; and 1 was reported by C. H. Marshall (*J. A. M. A.* **85**:875 [Sept. 19] 1925) in the United States. It is noteworthy that in these cases treatment was instituted at the time of early onset of the elephantiasis and before the overgrowth of the connective tissue had become permanent and sclerosed. Prior to the discovery of arsphenamine, syphilitic elephantiasis responded little or not at all to mercury and iodine. The literature leaves a strong impression that elephantiasis of the external genitalia in which changes have become permanent is best managed by surgical methods.

Two Cases of Chronic Ulcers of Legs in Patients with Sickle Cell Anemia.

Presented by DR. C. L. CUMMER and DR. C. G. LAROCCO.

CASE 1.—L. M., a Negress aged 15, was first seen in the dermatologic department of the St. Vincent Charity Hospital dispensary in April 1934. Because of anterior bowing of the tibias and the presence of syphilis in the patient's mother, considerable antisyphilitic therapy was given, although serologic reactions for syphilis were negative. No improvement in the ulcers on the legs resulted. The patient was referred to City Hospital in December 1935, and a diagnosis was made of "erythema induratum and bony and dental changes of rickets."

Examination shows the tibias to be much deformed, being bowed anteriorly. The lower parts of the legs show many deep, depressed and retractile scars. At the present time there are no open ulcers, but before the patient's stay in St.

Vincent Charity Hospital there were several deep indolent ulcers about 2 cm. in diameter; these were covered with heavy crusts.

In addition to rachitic bony and dental changes there was a systolic murmur at the apex. The edge of the spleen was palpable. The scleras showed no icterus.

Previously several examinations of blood had failed to reveal sickle cells, but recently definite sickling was found in a specimen at the end of two hours. A blood count on March 8, 1939, showed 4,636,000 erythrocytes, 6,200 leukocytes, 63 per cent hemoglobin, 68.6 per cent polymorphonuclears, 23.9 per cent lymphocytes, 4.3 per cent monocytes, 2.8 per cent eosinophils and 0.4 per cent mast cells.

The cells varied greatly in size and shape. There were elongated meniscus cells in fair number in every field, also racket-shaped and flask-shaped cells. The intensity of staining varied greatly. The hemoglobin readings have been as low as 50 per cent.

The icteric index was —2.

When the patient was in the City Hospital, in 1935, tuberculin tests gave the following results: with a dilution of 1:1,000,000, 1 plus; of 1:100,000, 2 plus, and of 1:10,000, 3 plus.

Wassermann reactions were negative on numerous occasions. Examinations of the spinal fluid at the City Hospital in 1935 and at St. Vincent Charity Hospital in February 1938 was entirely negative.

The urine was normal.

Roentgen examinations of the chest in 1936 showed the lungs clear and the heart of normal size and shape; examination of the legs, also in 1936, showed marked anterior bowing of the tibias. The cortex was considerably thickened posteriorly, this change being said to be characteristic of rickets. Similar observations were made in 1938. Roentgenograms of the skull in 1938 showed no osteoporosis, but thickening of the vault to the upper limit of normal. There were no radiating striae of bone, such as are occasionally seen in certain forms of anemia.

Complete healing followed hospitalization and the application of mild antiseptic dressings.

CASE 2.—W. M. G., a Negress aged 23, on March 13, 1936, came to the surgical department of the dispensary of St. Vincent Charity Hospital, stating that two weeks previously she had scratched a pimple on her leg and that it had become infected. The Wassermann reaction was negative, but she was referred to the department of dermatology and syphilology for antisyphilitic treatment. While she was under observation the ulcers healed almost completely, only to break down rapidly. Healing had no relation to the antisyphilitic treatment.

On the inferior portions of the legs there have been irregular and rather extensive and deep ulcers with sluggish bases. These are located on the anterior and outer aspects and are approximately symmetric in distribution. On healing the scars are smooth, depressed and atrophic.

The patient has one child, aged 2 years, who recently underwent splenectomy at Lakeside Hospital for splenomegaly and severe sickle cell anemia.

The medical department made a diagnosis of rheumatic cardiac disease. The margin of the spleen was barely palpable.

There have been many examinations of the blood, sickle cells having been found at times, but not always. There have been numerous negative Wassermann reactions. The latest blood count, on March 8, 1938, showed 4,350,000 erythrocytes, 6,700 leukocytes and 71 per cent hemoglobin. The differential count showed 69.6 per cent polymorphonuclears, 23.2 per cent lymphocytes, 6.4 per cent monocytes and 0.8 per cent eosinophils. The stained films showed some anisocytosis, slight polychromatophilia and slight poikilocytosis.

The icteric index was 3.5.

The roentgenologists reported that there was no osteoporosis of cranial bones or of vertebrae.

DISCUSSION

DR. E. W. NETHERTON: After seeing the patient I presented here previously (ARCH. DERMAT. & SYPH. **34**:158 [July] 1936) I looked up some of the available literature, and one of the striking things I found is that the ulcers are usually thought to be syphilitic or tuberculous or due simply to circulatory stasis. There seems to be nothing characteristic about their clinical appearance. They are chronic and usually bilateral, and do not respond to topical applications. In my case application of boric acid ointment, cleanliness and as much rest as possible did as much as anything. The lesion healed once almost completely. With these nondescript ulcers which cannot be diagnosed as anything else, especially in Negroes, sickle cell anemia must be kept in mind.

DR. R. E. BARNEY: In case 2 there is definite scarring in the cervical region, suggesting scrofuloderma. A great many scars the size of a split pea on the lower extremities suggest papulonecrotic tuberculid.

DR. CLAUDE BAZIL NORRIS, Youngstown, Ohio: I saw Dr. Netherton's patient before. The ulcer healed completely two or three times, once when the patient had been sick and had to go to bed. I thought it was tuberculous and gave ultraviolet irradiation, with no particular benefit, as well as cod liver oil and iron tonics. The patient's mother had multiple sarcoid, and there was tuberculosis in his family. I wonder if tuberculosis could be underlying this condition. In this case sickling of the cells was observed one hour after the preparation was made.

DR. E. W. NETHERTON: The patient Dr. Norris and I saw had severe scarring. A brother also had sickle cell anemia with ulcers on the legs.

DR. C. L. CUMMER: In case 2 sickling of the cells was found on only one examination, although I have examined the blood on several occasions. In case 1 I observed sickle cells in a preparation kept for two hours. Both patients have some anemia.

DR. W. F. SCHWARTZ: In regard to the severity of the disease and the extent of sickling, the patient I presented (ARCH. DERMAT. & SYPH. **37**:866 [May] 1938) had only three ulcers, and the largest one was not over 1.25 cm. in diameter. At least 95 per cent of the cells were sickled. The percentage of sickling varied from day to day.

DR. H. G. MISKJIAN: I am willing to say that I agree fully on clinical grounds with the diagnosis Dr. Barney made in regard to the older patient. The ulcers themselves are not so characteristic, but on the upper third of the leg there are definite scars that probably are the remains of papulonecrotic tuberculid. They are somewhat more extensive at present. I think dermatologists should favor the diagnosis of tuberculous ulcers more than sickle cell anemia.

DR. C. L. CUMMER: Previous presentations of ulcers of sickle cell anemia at meetings of this society stimulated Dr. LaRocco and me to think of that possibility in these cases. We have had them under our observation for some time. One patient was refered to us for syphilitic ulcers. The other was treated in the outpatient department for syphilitic ulcers. At one time I felt that case 2 was one of erythema induratum. The younger girl (case 1) had been regarded at City Hospital as having erythema induratum. The sickle cells have not been constant in these cases, and I understand that is usually the case. The last time I examined the first patient I found extensive sickling. These ulcers have cleared up and broken down without any regard to antisyphilitic therapy. Rest in bed and simple topical applications seem to be the best treatment.

A Case for Diagnosis. Presented by DR. C. G. LAROCCO.

Psoriasis. Presented by DR. GARRETT ARTHUR COOPER.

Cutaneous Horn. Presented by DR. C. L. CUMMER and DR. C. G. LAROCCO.

Parapsoriasis. Presented by DR. H. N. COLE and DR. J. R. DRIVER.

CLAUDE BAZIL NORRIS, M.D., *President*

May 26, 1938

C. L. CUMMER, M.D., *Secretary*

J. R. DRIVER, M.D., *Reporter*

Alopecia Cicatrisata. Presented by DR. R. E. BARNEY.

S. F., a housewife aged 38, complains of an eruption on the scalp of two years' duration.

Involving the middle of the occipital region just below the vertex is an area of alopecia half the size of a palm. The center of the lesion is occupied by scar tissue, while the periphery is dully erythematous and covered by a slight scale or crust. To the left and below this patch are several similar dull red approximately dime-sized lesions. On the scalp just above the left ear is a similar dime-sized lesion. In addition, scattered throughout the scalp are numerous dead white slightly depressed scars, varying in diameter from a few millimeters to a centimeter.

Serologic tests for syphilis were negative.

DISCUSSION

DR. H. N. COLE: Has any therapy been given to the lesions on the back of the head?

DR. R. E. BARNEY: I used boric acid ointment only.

DR. H. N. COLE: I believe the condition is lupus erythematosus. I think with a diagnosis such as Dr. Barney suggests one would expect to find a whitish lesion, while on the back of the head there are reddish lesions with rather suggestive follicular plugging.

DR. GEORGE HASKEL CURTIS (by invitation): In the right ear is a lesion about 1 cm. in diameter. The border is somewhat reddened and elevated, and there are dilated follicular openings. I too believe the condition is lupus erythematosus.

DR. R. E. BARNEY: In addition to the active lesions that the patient presents, there are scattered throughout the scalp areas of varying size, which consist of dead white depressed scars. The active lesions show definite scar formation. When I first saw the patient, the borders were erythematous, with slight weeping and crusting, and not the type of scarring I should associate with lupus erythematosus. Some of the hair follicles appear somewhat dilated, but I think that would be true in any inflammatory condition of the scalp. The central scar formation and the dead white depressed scars suggest to me more the diagnosis presented. I was unable to get the patient's consent to biopsy.

A Case for Diagnosis. Presented by DR. W. F. SCHWARTZ (from the Department of Dermatology and Syphilology, City Hospital).

M. W., a woman aged 36, had active secondary syphilis in 1926, diagnosed at the City Hospital on the basis of the results of a dark field examination and a 4 plus Wassermann reaction. The patient received thirty-three injections of old arsphenamine and approximately thirty mercury rubs in the subsequent year and a half. In 1930 the Wassermann test of the blood and examination of the spinal fluid gave negative results.

About April 1 of this year the patient had tonsillitis with chills and fever and was treated by a physician for three weeks. At the end of this time headache and the present eruption developed. The eruption first appeared on the arms and spread to the trunk. The lesions did not itch and disappeared after a few days. However, new lesions appeared elsewhere.

The eruption is generalized, papular and widely dispersed. The papules are moderately indurated and vary in size up to that of a split pea. On each forearm there is a group of small flat papules in annular arrangement. There are no lesions on the mucous membranes of the mouth or genitalia.

The Wassermann reaction was 2 plus and the Kline 4 plus. Tuberculin tests gave negative results, and roentgenograms of the chest showed no sign of tuberculosis.

Histologic examination showed no change in the epidermis except loss of rete pegs due to pressure from underlying cellular infiltrates in two places. The cell masses were high in the corium and well delimited and consisted of a granulomatous infiltrate with many giant cells but no plasma cells. Perivascular infiltration was not seen, either in the cell masses or elsewhere in the section.

DISCUSSION

DR. H. A. HAYNES: I should like to suggest a diagnosis of lichen nitidus. I admit that the lesions are a little large, though I have observed 1 or 2 cases in which the lesions were as large as this. The biopsy is especially interesting. There are numerous giant cells and flattening of the rete pegs, which fit in well. Of course the question whether lichen nitidus is of tuberculous origin is not clearly answered in the literature.

DR. G. W. BINKLEY: My reaction to the serologic results is that this patient's blood is low in syphilitic reagins. It is possible that another laboratory with more sensitive complement fixation would report a more strongly positive Wassermann reaction.

DR. C. L. CUMMER: I feel that this woman has a reinfection—a new infection. She has a history of syphilitic infection, was treated for it and had what looked to be nearly adequate treatment. She now returns with a papular eruption and a recurring positive serologic picture.

DR. G. W. BINKLEY: Another possibility is relapsing syphilis.

DR. E. W. NETHERTON: It is difficult for me to correlate the histologic and the clinical picture. There are grouped lesions that are infiltrated, suggesting syphiloderm. Some of the papules are flat and with the type of scaling present look much like secondary papular syphilis to me. In the histologic preparation one area has a large number of giant cells and epithelioid cells and no definite well defined tubercles. It is difficult to correlate those observations. If the condition is a reinfection, as suggested by Dr. Cummer, there should be some information regarding a new primary lesion or some lesions about the genitalia to suggest that the patient may have been newly infected with syphilis. I believe the condition is tuberculosis of the skin.

DR. H. N. COLE: After reviewing her therapy, I feel that she did not have as much heavy metal as she should have had. I am inclined to favor a diagnosis of syphilitic cutaneous relapse.

Pemphigus Vulgaris in a Negro. Presented by DR. W. F. SCHWARTZ (from the Department of Dermatology and Syphilology, City Hospital).

D. H., a Negro aged 68, was in good health until six weeks ago, when the eruption which is now present began and became progressively worse.

At present there is distributed over the entire trunk both anteriorly and posteriorly an almost uniform denudation of the skin, due to confluence of many circinate individual bullae. A few similar discrete and confluent lesions on the forearms and thighs, as well as a few thin-walled, pustular bullae on the thighs show Nikolsky's sign and no surrounding inflammation. The face is relatively free of lesions, except for weeping edematous dermatitis about the eyes and a few small annular denuded areas on the forehead. There are no lesions in the mouth.

Urinalysis showed no abnormality, and a Kline test was negative. There were 4,300,000 erythrocytes, 11,100 leukocytes, and 60 per cent hemoglobin (by the Tallqvist method). A differential blood count revealed a slight increase in polymorphonuclears, with 4 per cent eosinophils.

DISCUSSION

DR. H. J. PARKHURST, Toledo, Ohio: I was struck by the absence of lesions on the oral mucosa. I should classify the condition as pemphigus foliaceus.

DR. W. F. SCHWARTZ: Pemphigus in the Negro seems to be rare. H. H. Hazen (ARCH. DERMAT & SYPH. **31**:316 [March] 1935) found only 8 cases among 12,000 instances of dermatosis in this race.

Kaposi's Varicelliform Eruption in an Adult. Presented by DR. W. F. SCHWARTZ (from the Department of Dermatology and Syphilology, City Hospital).

M. S., a woman aged 32, was in good health until May 7, 1938, except for chronic eczema, which she had had since childhood. Suddenly on this date the face became edematous, and several pustules appeared. Pustules continued to appear, rupture and become confluent, leaving crusted areas. She was admitted to City Hospital on May 16, with a diagnosis of possible erysipelas or smallpox.

Patient's appearance when admitted to the hospital.

A plateau type of temperature ranging from 38.4 to 40.5 C. (101.12 to 104.9 F.) was present for the first four days of hospitalization, during which time a few new pustules appeared. The patient was critically ill and toxic. The temperature has been normal for the past five days, and the patient's general and local condition is improving.

At the time of admission to the hospital the face was profoundly edematous, with closure of both eyes and edema of the lips. Over the front of the cheeks there was a diffuse honeycomb type of crust, which, when removed, revealed many discrete and confluent umbilicated tense pustules and superficial denuded areas. On the forehead, nose, chin and sides of the cheeks were many similar discrete pustules, ranging up to 4 mm. in diameter, with no surrounding zone of erythema. A few of the latter lesions have ruptured, leaving sharply demarcated shallow ulcers. Suddenly on the fifth day the temperature returned to normal, the general condition of the patient improved, and the edema and pustulation of the face began to disappear. A few submental and submaxillary lymph nodes were palpable and tender.

Direct smear and culture of material from an unruptured pustule revealed only Staphylococcus albus. There were 4,300,000 erythrocytes and 75 per cent hemoglobin (by the Tallqvist method). There were 8,750 leukocytes, and the differential count was essentially normal. The urine was normal. Blood cultures were negative. Serologic tests for syphilis were negative.

Treatment has consisted chiefly of removal of crusts by scrubbing with soap and water, application of potassium permanganate compresses, general supportive and antipyretic measures and application of an ice collar to the neck.

DISCUSSION

DR. G. W. BINKLEY: I saw this woman a few days ago, and at that time her face was intensely edematous. She had used soaks of mercury bichloride the preceding day. I think they were stopped and potassium permanganate used. I should like to know if she has been tested for sensitivity to mercury.

DR. W. F. SCHWARTZ: I think not. The condition was not more edematous after mercury bichloride compresses were used, but in order to save confusion I changed to potassium permanganate. One of the characteristics of Kaposi's varicelliform eruption is the acute abrupt onset. The most striking feature is the profound edema. I believe the appearance in some cases suggests impetigo, but the clinical course is different, manifested by acute onset, edema and extreme toxicity. The mortality is definitely above 25 per cent, and probably close to 40 per cent. It is unusual to see this condition in an adult.

DR. H. N. COLE: The photograph presented with the patient shows classic Kaposi's varicelliform disease. On the other hand, here is an adult with chronic dermatitis, who has contracted this varnish-like type of crusting on the face. I wonder if it is possible for certain types of Bockhart's staphylococcic impetigo to resemble Kaposi's varicelliform eruption closely. While the picture is characteristic of Kaposi's disease, the case may be one of Bockhart's impetigo. I think this acute process is going to clear up, but the patient will still have her underlying dermatitis.

Tuberculosis Verrucosa Cutis. Presented by DR. GARRETT ARTHUR COOPER (from the Department of Dermatology and Syphilology, Lakeside Hospital).

E. B., a Negress aged 51, had the right middle finger amputated in 1933 on account of tuberculous dactylitis. In 1935 she had bronchopneumonia and pyelonephritis. Approximately three years ago an eruption developed on the back of the right hand; this has persisted and slowly extended. Biopsy was performed in 1936. The pathologic report stated that the tissue showed only chronic inflammation. Nine roentgen treatments of 100 r each resulted in only moderate improvement. Two years ago a similar lesion developed on the outer surface of the right forearm.

On the dorsum of the right hand is an infiltrative plaque 6 by 3.75 cm., and another 7 by 3.25 cm. is present on the extensor surface of the forearm. The central portions are ulcerated, granulomatous and covered with a crust. The plaques are reddish and raised about 2 mm. above the surface.

Roentgenograms of the chest showed an infiltrating mass in the region of the hilus, suggestive of tumor rather than tuberculosis. However, there were no other changes which would substantiate the diagnosis of tumor.

No tubercle bacilli were found on repeated examinations of the sputum. Serologic tests for syphilis were negative.

A histologic examination of tissue from the edge of the ulcer on the hand revealed thickening and elongation of the rete pegs. In the corium there was an infiltrate, consisting of lymphocytes, plasma cells, large mononuclear cells and fibroblasts. There were a few giant cells of the Langhans type, surrounded by epithelioid cells and lymphocytes.

DISCUSSION

Dr. John A. Gammel: This woman is a vegetable cook at a Cleveland hospital, where she has worked for thirty-one years. Originally the lesion on the hand was much smaller than it now is. I performed a biopsy, and the condition did not prove to be tuberculous. A second biopsy about a year later revealed only chronic inflammation. A third was performed last week, and the pathologic opinions were divided. Dr. H. T. Karsner stated that the process is tuberculous. I looked up the old hospital records of the patient and found that she had had pulmonary tuberculosis.

Dr. J. R. Driver: I believe the lesion on the back of the hand is characteristic of tuberculosis verrucosa cutis. It is in a common location. She has a pathologic process in her lungs, which was diagnosed as tuberculosis. I should suggest treating the lesions on the skin by irradiation. Roentgen rays could be used, in a carcinoma fractionated dose, by one of the modifications of the Coutard technic.

Dr. R. E. Barney: I believe the treatment Dr. Driver has outlined would be the safer procedure, because if the condition is tuberculosis verrucosa cutis, I think curettage would tend to disseminate tubercle bacilli into the blood stream. Irradiation should be tried first.

Dr. H. N. Cole: I agree with the diagnosis. Certainly I do not believe the patient should be cooking vegetables in a hospital—or any other place.

Morphea Guttata. Presented by Dr. Frank McDonald (from the Department of Dermatology and Syphilology, City Hospital).

Papulonecrotic Tuberculid or Secondary Syphilis. Presented by Dr. W. R. Love (from the Department of Dermatology and Syphilology, City Hospital).

Lichen Planus or Prurigo of Hebra. Presented by Dr. W. F. Schwartz (from the Department of Dermatology and Syphilology, City Hospital).

A Case for Diagnosis (Purpura?). Presented by Dr. R. E. Barney.

NEW YORK ACADEMY OF MEDICINE, SECTION OF DERMATOLOGY AND SYPHILIS

Louis Chargin, M.D., *Chairman*

May 3, 1938

Harry C. Saunders, M.D., *Secretary*

Erythredema (W. Swift) (Acrodynia; Pink Disease; Dermatopolyneuritis; Feer's Disease). Presented by Dr. Eugene Traugott Bernstein.

H. H., a Jew aged 6½ years, is presented from Mount Sinai Hospital. At the age of 13 months the patient had an attack of dysentery, following which his hands and feet became red and there were profuse perspiration and itching of the trunk. These symptoms lasted for about a year and were similar to the patient's present condition. In February 1936 he had otitis media and pneumonia. Mastoidectomy was done. In May 1936 he had measles. Shortly after this the present condition developed. The skin over the entire abdomen and the sacrum is infiltrated, lichenified, pigmented and cold and clammy. The general tone is diminished. Lichenified papules located at the mouths of the sweat ducts are coalescent. The hands and feet are swollen and appear disproportionately large. They are cold

and clammy and of a dusky red. There is no desquamation. The cutaneous temperature is normal. Immersion of the hands in hot water causes redness to become intensified, with clearcut demarcation at the point where the water stops. Immersion in cold water causes pain in the extremities. With the onset of pain, a reddish cyanosis of the hands and feet is noticeable, and in cold water the extremities become markedly cyanotic. The definite demarcation of color at the wrists and ankles is always present during the attacks. The body is fairly well developed but poorly nourished. For the past three days an eruption composed of small acuminate and flattened shiny papules has been present on the anterior aspects of the legs and in the popliteal fossae.

Roentgenograms of the chest and the long bones showed no abnormality. The von Pirquet test gave a negative result and the Mantoux test a positive result. Examination of the blood showed 256 mg. of cholesterol, 105 mg. of cholesterol esters, 8 mg. of urea nitrogen, 11.2 mg. of calcium and 6 mg. of phosphorus per hundred cubic centimeters. Examination of the hair, nails and urine showed a faint trace of arsenic. Capillary microscopy showed normal capillaries, in spite of the redness of the hands and feet. The patient's reactions to sympathicotonic and to parasympathicotonic drugs were as follows: Atropine was given to the point of tolerance, with no variation in the itching, perspiration or color of the extremities. Iontophoresis with acetylcholine (0.025 Gm.) applied to the right hand, seven treatments being given during two weeks, produced no apparent benefit. Capillary back pressure study showed a persistence of more than 110 above systolic pressure on the right arm (method of Lewis and Perry). Epinephrine pricked into the skin of the dorsal surface of the forearm and the hand showed a less evident and less regular reaction in the hand, where two pricks were required. When pressure was applied, the pallor disappeared in the hand at 70 and remained in the arm over 100.

Today the child complains of gastric attacks. He is extremely well oriented, bright and cooperative at school, but has an unhappy tearful irritable expression. He resents disturbance or handling of any kind and when disturbed reacts to an almost maniacal degree. There is exhausting nervous weakness after the paroxysmal attacks of itching, which induce uncontrollable rubbing and scratching. Intermittently severe pain in all the fingers and toes radiates up the arms and legs. There are attacks of profuse and drenching perspiration, saturating the clothes and bed linen. The mother states that the child threatens suicide during the attacks. Examination of the nervous system showed normal reflexes, no paresthesia or impairment of touch or temperature sense, no photophobia and normal eyegrounds. Physostigmine sulfate given by mouth had no effect. General physical examination showed no abnormality except a soft murmur. The blood pressure was 110 systolic and 60 diastolic. The blood count showed 94 per cent hemoglobin, 4,760,000 red blood cells, 7,000 white blood cells and 270,000 platelets. A tourniquet test gave negative results. The bleeding time was three and one-half minutes.

DISCUSSION

DR. LOUIS TULIPAN: I think the condition is generalized neurodermatitis.

DR. FRANK C. COMBES: I wish to agree with the diagnosis of erythredema, and I think Dr. Bernstein is to be congratulated on his complete description.

DR. BEATRICE M. KESTEN: I think it would be unfortunate to have this case go down on the record at this time as one presented with a diagnosis of acrodynia. The child presents a papular eruption below the knees, which is consistent with papular eczema, and none of the signs of acrodynia.

DR. ERICH URBACH, Vienna, Germany (by invitation): I believe the condition is only neurodermatitis, but I am not sure.

DR. ISADORE ROSEN: I agree with the diagnosis presented by Dr. Bernstein because I saw the patient on a previous occasion, when the disease was in the active stage. Furthermore, he was hospitalized for many months and carefully

studied from all angles by experienced pediatricians, who observe more cases of this disease than do the dermatologists. It was they who made this diagnosis. The facts were all brought out carefully in the history given by Dr. Bernstein.

DR. HERMAN GOODMAN: I have studied so-called pink disease thoroughly. I had 2 excellent examples and then a third example of what was thought to be pink disease appeared. Dr. Traub observed the third case for months, if not years. The child was found to be eating lead paint from its crib. The lead was the cause of the symptoms. Therefore, it is impossible at the moment to make the diagnosis. In cases of proved pink disease clinical improvement, if not cure, has followed treatment with brewer's yeast. A similar clinical condition not responding to yeast is due to intoxication with a heavy metal. The diagnosis is not easy.

DR. EUGENE TRAUGOTT BERNSTEIN: I agree with Dr. Tulipan that there are features of neurodermatitis which, of course, fit in well with acrodynia. The neurodermatitis is an end result of the characteristic miliary eruption, associated with itching, perspiration and pigmentation. There are intense pains and all the other characteristics of acrodynia or pink disease except photophobia, but many cases have been reported in which there is no photophobia. Erythredema became better known in this country in 1925, when J. Butler published a series of cases (ARCH. DERMAT. & SYPH. **11**:166 [Feb.] 1925), and it was described in 1921 by Feer in Zurich, Switzerland, under the name "neurosis sui generis of the vegetative system." Feer expressed the belief that from the pathogenic standpoint the condition is due to a virus infection similar to, but not identical with, epidemic encephalitis, which enters the body through infection of the rhinopharynx. The infection seems to have a predilection for the vegetative centers of the diencephalon and mesencephalon. The previous history of the child reveals a series of infectious diseases preceding each attack of acrodynia, which may point to a virus theory of the disorder.

Pityriasis Rubra Pilaris. Presented by DR. BOLESLAW LAPOWSKI and DR. ABRAHAM WALZER, Brooklyn.

L. B., a man aged 63, is presented from the Good Samaritan Dispensary because of an eruption of eleven months' duration involving the entire trunk, the face and extremities. He is a house painter, but has not worked for over one year. He had an infection of the left foot, for which he was confined to bed for four weeks. He had been taking bromides and acetylsalicylic acid in considerable amounts, but these drugs were discontinued when he was first seen at the dispensary nine months ago. He stated that he had taken no other medicines. There is no history of any similar eruption in his family.

The present trouble began with a nonpruritic rash in the lumbar region, which he claims spread "following exposure to the sun," and in six weeks the rash had spread over practically the entire body. One month or so after the onset of the rash the patient says the skin of his palms and feet became thickened. The duration is now eleven months. He was treated with mild ointments and lotions.

There is an almost generalized yellowish pink eruption covering the entire trunk, face and extremities, with here and there islands of normal skin of various sizes and shapes. The eruption is not elevated, infiltrated or pruritic. On the backs of the proximal phalanges are beginning keratotic follicular lesions. The skin on the palms and soles is thickened, but of the same color as the eruption on the body. There is no hyperhidrosis and no surrounding areolas. The nails are thickened, and some of them show a heaping up at the free edge. The scalp is slightly scaly, but the hair is not affected. The mucous membranes of the mouth are somewhat congested. Physical examination, examination of the blood and urine and serologic tests showed no abnormality. The urine showed no arsenic.

Histologic examination showed nothing characteristic of any entity. The epidermis was reduced to from five to eight layers, with a loss of most of the rete

pegs and papillae. There was moderate hyperkeratosis, but no follicular plugging. The cutis showed slight vascular dilatation and edema, with moderate perivascular infiltration.

DISCUSSION

Dr. Oscar L. Levin and Dr. Fred Wise agreed with the diagnosis.

Dr. David Bloom: It is my understanding that papules with spiny tips and the nutmeg grater-like appearance produced by the grouping of discrete papules are pathognomonic and essential features of this disease. These are absent in this case, and I am, therefore, uncertain of the correctness of the diagnosis of pityriasis rubra pilaris.

Dr. Abraham Walzer, Brooklyn: In answer to Dr. Bloom, the keratotic lesions need not be present at the beginning. The question has always arisen as to what the primary lesion is. On the one hand, cases have been described in which keratotic lesions were the primary ones. On the other hand, cases have been described in which these occurred only late in the disease. The picture this man presents is more or less characteristic of pityriasis rubra pilaris which has not yet fully developed.

Psoriasiform Syphilis. Presented by Dr. Andrew Harp Montgomery.

F. McD., a man aged 35, is presented from the New York Polyclinic Medical School and Hospital for Dr. R. J. McDonald, of Paterson, N. J. The patient was previously presented before this section in 1935 (Arch. Dermat. & Syph. **35**:310 [Feb.] 1937). He had a penile lesion on Nov. 8, 1933, followed by a profuse secondary eruption, which disappeared under treatment. Later bilateral nodules and serpiginous and arciform patches with a marked tendency to ulceration appeared on his arms. In spite of intensive treatment (seventy-five injections of neoarsphenamine, 0.6 Gm.; over one hundred injections of mercury and a bismuth preparation; courses of a preparation of sterile milk, and potassium iodide) little lasting impression has been made either on his serologic or on his cutaneous manifestations. Cessation of antisyphilitic treatment has been followed by recurrences.

At present rather bright red scaly and crusted patches, discrete and confluent, with configurations, are present on the left shoulder, arm, elbow and forearm, on the right forearm and wrist, on the lips, especially the lower, in the scalp and on the tip of the glans penis. On the inner sides of the thighs are numerous minute scaly patches. Ulceration and superficial scarring have been a feature of the case. Extensive sharply limited circinate scars cover the wrists and parts of the forearms. They are also found on the legs and scrotum. There is a healing ulcer on the right wrist. Two months ago there was active ulceration in this location, on the left elbow and on the scrotum. Patches have arisen on the right wrist, in an area previously scarred.

Since the previous presentation in 1935 the patient has received 0.6 Gm. of neoarsphenamine at weekly intervals almost continually.

DISCUSSION

Dr. Isadore Rosen: This condition is usually a late secondary manifestation in patients who have had irregular syphilitic treatment or are undernourished from various causes, such as chronic alcoholism and drug addiction. I should suggest that this patient be treated by hyperpyrexia. I have had unusually good results in this type of case with this form of therapy.

Dr. David Bloom: I wish to ask the presenter if this patient had regular antisyphilitic treatment from the beginning of the infection.

Dr. Frank C. Combes: I agree with what Dr. Rosen has already said about the psoriasiform lesions on the mouth, but I do not understand the cause of the lymphedema. I wish Dr. Montgomery would say a few words about that. I am totally unfamiliar with this finding in syphilis.

DR. HERMAN GOODMAN: Is it the consensus that secondary syphilis leaves fine scarring on places where lesions were said to have been present a year or a year and a half ago? Is it possible to make the scarring conform to the diagnosis of secondary syphilis?

DR. E. WILLIAM ABRAMOWITZ: I should like to answer Dr. Goodman's question, if I may. I think it is sometimes difficult to differentiate between the psoriasiform papular syphiloderm of the secondary period and the scaly nodular eruption of the late period. This particular type of psoriasiform eruption is known to be a manifestation of tertiary syphilis, for there is typical scarring. A destructive lesion usually means tertiarism, although it may appear precociously.

DR. CHARLES WOLF: I should like to make an analogy. In secondary syphilis there may be trophic lesions. A macular atrophy may follow a macular eruption. Therefore, atrophy in secondary syphilis is not unusual.

A Case for Diagnosis (Dermatitis Medicamentosa Due to Ethyl Aminobenzoate?). Presented by DR. HENRY D. NILES.

P. N., a man aged 42, is presented because of an eruption on the trunk and extremities of four weeks' duration. The onset of the generalized eruption was sudden, about one week after he began to use rectal medicone suppositories (these contain ethyl aminobenzoate, oxyquinolin, ephedrine, bismuth subgallate and peruvian balsam). The eruption has been pruritic only when scratched. No other drugs have been used except liquid petrolatum. He has made no change in soap and knows of no exposure to external irritants.

When the patient was first seen the eruption was generalized, but at present the eruption on the trunk has almost disappeared. There are many red macules and papules varying in size from that of a pinhead to that of a small lentil on the flexor surfaces of the arms and wrists and on the legs and feet. Some of the macules are slightly scaly. There is some scaling from previous ultraviolet irradiation. Several of the lesions on the lower parts of the legs, the ankles and the feet are annular and definitely purpuric.

There has been no opportunity to perform any cutaneous tests because of the almost universal eruption. The patient cannot be persuaded to try using the suppositories again.

DISCUSSION

DR. E. WILLIAM ABRAMOWITZ: It is difficult to state with any degree of definiteness whether this eruption could have been produced by the "medicone" suppositories. One would expect at least, since the eruption is eczematous, a considerable amount of eruption on the buttocks close to the area with which the medication came in contact. I do not know what importance to attach to the purpuric eruption on the legs, because that is often a feature in that location. I am afraid the only proof here would be repeated use of the suppository to see if the eruption recurred.

DR. CHARLES WOLF: Before one can incriminate the ethyl aminobenzoate, it would be advisable to find out what other ingredients are present in the suppository —belladonna, for example. This eruption is toxic and erythematous, on the order of erythema toxicum or erythema multiforme. I do not know if ethyl aminobenzoate can produce an eruption of this nature, but I know that belladonna can.

DR. ISADORE ROSEN: If my observation is correct, I should like to call the attention of the presenter to certain raised shiny violaceous lesions on the lower extremities and the forearms which suggest lichen planus. Interspersed with these are lesions which strongly suggest purpura annularis telangiectodes, and pinhead-sized lesions which give the impression of dermatitis venenata but which on careful inspection are seen to be small papules of lichen planus. Often good clinicians will make a diagnosis of dermatitis venenata for this type of lesion, but they change their opinion after further study.

DR. OSCAR L. LEVIN: The patient presents generalized universal toxic erythema and lesions of lichen planus on the lower and upper extremities. I wish to agree with Dr. Rosen in his diagnosis of lichen planus.

DR. HENRY D. NILES: There is no belladonna in the medicone suppositories, as far as I can find out. I consider ethyl aminobenzoate the most likely irritant. The condition of the trunk and arms has improved considerably, but apparently the lesions on the legs have become more marked.

A Case for Diagnosis (Gonococcic Infection of the Skin?). Presented by DR. SAMUEL FELDMAN.

C. F., a man aged 29, states that he noticed swelling and pain in the inguinal glands on both sides on April 25, 1938. In addition to the inguinal adenitis a swelling of the prepuce appeared. Simultaneously with the appearance of the local lesions, the patient felt general weakness, chilliness, headache and fever. Within twenty-four hours the penis became enormously swollen. There was no pain on urination and no discharge from the urethra, and the only discomfort the patient experienced was due mainly to the weight of the organ. The patient had had three attacks of gonorrhea, the last one in 1932. Since then he had been apparently well.

When the patient was first examined, on April 26, there were no objective findings except the penile swelling and the inguinal adenopathy. There were no ulcerated lesions anywhere; the foreskin was readily pushed back, and no lesions could be found on the glans. There was no urethral discharge. A wet dressing of gauze saturated with solution of boric acid was applied.

The condition remained stationary until April 28, when a "blood blister" appeared on the foreskin. This broke down on the same day and formed an ulcer, which rapidly became larger. With the formation of the ulcer the swelling of the penis was reduced by one half. There were no marked changes in the condition of the patient and the appearance of the lesion, and on May 2, when the patient was examined again, there was only one addition to the picture just described, namely, a hard slightly bluish bulge on the left side of the shaft of the penis. At the present time the penis is less swollen than it was at the onset. The lower surface of the prepuce presents a necrotic area about 2 inches (5 cm.) in diameter. The margin is deeply ulcerated and is surrounded by an undermined border. In the central portion of the necrotic area the skin is not thrown off but is transformed into a brownish gray adherent slough. On its surface venules filled with black thrombi are seen. No examination of the glans and the meatus can be made, as it is impossible to force back the prepuce.

No spirochetes were seen on dark field examination. The Kahn and the Wassermann test were negative. The Frei test gave an indefinite reaction on the fourth day, showing only a small circumscribed red area and slight infiltration. Specimens stained with the Pappenheim and with the Gram stain showed no Ducrey bacillus. Numerous intracellular and extracellular gram-negative diplococci were seen in smears and scrapings of material from the base and edge of the ulcer. The cellular element practically covered the field, and polymorphonuclear leukocytes filled with diplococci were by far the predominating type of cell recovered from the scrapings. The patient's urine was cloudy and contained shreds. Microscopic examination of a centrifuged specimen of urine for gonococci gave unsatisfactory results.

The patient was given sulfanilamide by mouth, but it is too early to expect any results from the medication.

DISCUSSION

DR. ERICH URBACH, Vienna, Germany (by invitation): I think in this type of case it is necessary to make cultures for anaerobic organisms. Such an investigation is not easy and takes a long time, and it is better from a practical stand-

point to treat the condition from the start as an anaerobic infection. The best treatment is medication with hydrogen peroxide and also with special dyes (acriflavine).

DR. DAVID BLOOM: This lesion looks clinically like a gangrenous ulcer seen in Ducrey infection, but the statement of the presenter that numerous gram-negative cocci were present in the lesion should make one at least consider the diagnosis of gonorrheal ulcer. In order to settle this diagnosis, however, a much more thorough work-up of the case is necessary, for it is known that Ducrey bacilli in the pus of chancroid are not in the form of chains but single or in intracellular and extracellular groups, and as they are also gram-negative, they may be confused with gonococci. The autoinoculation test, the Ito-Reenstierna test and if possible culture are necessary to diagnosis of the condition. The small bubonulus on the right side of the shaft should also be investigated bacteriologically, for it may occur in gonorrhea as well as in chancroidal infection. Because of the unusual diagnosis entertained by the presenter, the effort and time spent on these investigations are worth while.

DR. ERICH URBACH, Vienna, Germany (by invitation): I would offer a serious warning against making injections of material from this lesion. A serious anaerobic infection may result.

DR. HERMAN GOODMAN: Years ago the lesion this man presents would have been called gangrenous balanoposthitis. Most laboratory men today would hesitate to name the gonococcus on the basis of observing intracellular gram-negative diplococci under the microscope. I should hesitate much to say that the lesions of the skin in material from which such an organism can be seen on microscopic examination should be called gonococcic infection of the skin.

DR. PAUL GROSS: The most important consideration in this case is prompt therapy. The lesion does not look like an ulcer, but rather like primary gangrene.

DR. LOUIS TULIPAN: I do not recall ever having seen an ulcer on the penis from gonorrhea. Erosions do follow a gonococcic discharge. The fact that the gonococcus was found here is not unusual, since the ulcer was bathed in the pus of the urethral discharge. This man has phagedenic ulcer, a condition frequently seen at Bellevue Hospital which gives negative reactions to all tests. I do not see why this disease should be considered the result of a gonococcic infection. Judging from the history of the onset given by the presenter, it is possible that this man had thrombosis of one of the penile veins, with subsequent necrosis. I do not think this condition should be considered a primary gonococcic infection of the skin.

DR. ISADORE ROSEN: I do not wish to doubt the microscopic observations of Dr. Feldman. I feel that his work was carefully carried out by laboratory technicians. On the other hand, if I had not known anything about the laboratory examinations, I should have made a diagnosis of chancroidal infection on clinical grounds alone, on account of the irregular undermined destructive character of the lesion.

DR. SAMUEL FELDMAN: There are several considerations here. I was told tonight that one can make a diagnosis by autoinoculation. Personally I do not see what could be accomplished by that method. If an ulcer should form, there would be no way to differentiate by that test between an infection by gonococci and by Ducrey bacilli. Also, this lesion came on so rapidly and looked so bad that the patient was given large doses of sulfanilamide (eighteen tablets since yesterday), with the result that the swelling has come down and the entire picture has changed. When I first saw the patient, the penis was four times as large as it is tonight. It improved a great deal during treatment with sulfanilamide. Therefore, the question of gonococcic infection must be kept in mind. Dr. Rosen says the condition is typical chancroid. I would say it was chancroid if it had not started with absolute necrosis. There are now a breaking down of the necrosis and

absorption of the necrotic mass. Dr. Tulipan says he has never seen an ulcer of the skin resulting from gonorrhea. Neither have I. I presented the patient for that reason. The lesion cannot come from the urethral discharge, because there is no discharge. There are only one or two cells to the high power field in a centrifuged specimen of urine. Besides everything else, the lesion is not an abscess. There is no pus. There is a second mass now, which looks the same as the broken down mass looked before the process was stopped by sulfanilamide therapy. I am not making a definite diagnosis, but I think gonococcic infection should be kept in mind. Gougerot and associates described 3 cases of this type (Gougerot, H.; Burnier, and Blum, P.: Gonorrheal Chancre, *Arch. dermat.-syph. de l'hôp. St. Louis* **1**:201, 1929. Gougerot, H.; Carteud, A., and Tardieu, A.: Chancroid, ibid. **1**:211 1929).

NOTE.—*Additional Data Obtained Since Presentation.*—Microscopic examination showed severe acute inflammation with necrosis. Staining of tissues showed no Ducrey bacilli. Several diplococci (?) and short-chained streptococci were seen.

An intradermal injection of vaccine made from Ducrey bacilli gave a negative result. Examination for Donovan bodies was negative.

A culture of the discharge, made by Dr. A. Cohen, of the Department of Health, showed no gonococci or Ducrey bacilli; instead, a diplobacillus resembling diplococcus was present.

The patient continued treatment with sulfanilamide, and his condition has progressed favorably.

A Case for Diagnosis (Mycotic Infection?). Presented by DR. BOLESLAW LAPOWSKI and DR. ABRAHAM WALZER, Brooklyn.

I. M., a man aged 35, is presented from the Samaritan Hospital, Brooklyn, with an eruption involving the glans penis, lips, soft palate, uvula and pillars of the fauces, of six months' duration. There is nothing of importance in the past history. Lesions first appeared on the penis, followed in a few days by lesions on the lips. The patient does not know how long he has had the lesions in the mouth.

Examination shows: 1. The entire glans penis, with the exception of a pea-sized patch on the left side, near the corona, is involved. The rest of the glans penis is erythematous, oozing and papillomatous. On the corona especially the oozing points are large and active. On the right side of the glans are two tiny scars, where biopsy specimens have been removed. 2. The lower lip is swollen and edematous and is covered with thick scabs. The dermal portion of the lip has numerous vertical cracks, some of them bleeding and others covered with a scab which, on removal, leaves a red oozing surface. On palpation no masses are felt within the lip. The upper lip shows a similar process, much less pronounced, with only faint scaling and slight swelling. 3. The soft palate, the uvula and the pillars of the fauces show many pinhead-sized elevations, round, red and some with a central white point like a follicular opening. On the soft palate is one pea-sized dome-shaped elevation, raised about ⅛ inch (0.32 cm.) above the surface and smooth, but surmounted by numerous white tiny follicular points. None of these lesions shows any areola. The inguinal and submaxillary glands are barely perceptible. There are no lesions on the rest of the body. Complete physical examination, blood counts, urinalysis and serologic tests showed no abnormality.

There has been considerable improvement in all of the lesions during the past few weeks, during mild external treatment. The possibility of ingestion of drugs has been completely excluded.

DISCUSSION

DR. BOLESLAW LAPOWSKI: In my opinion, the condition is of either bacterial or fungous origin; the simultaneous localizations (1) on the mucous membrane of the throat, (2) on both lips and (3) on the glans penis must be considered as

manifestations of one disease. It would be hard to reconcile those three localizations with erythroplasia.

DR. OSCAR L. LEVIN: I think the most important point in connection with this case is that one should not be too radical in treatment. In the past few years patients with this kind of disease with the diagnosis of erythroplasia have been presented and unnecessary overactive treatment may have been applied. It is my opinion that this patient should be treated conservatively, by local hygienic and mild antiseptic measures.

DR. ABRAHAM WALZER, Brooklyn: We feel that the condition is some type of infection, but do not know yet what type it is. Under the mildest kind of treatment, with simple pastes, lotions and mild mouth washes, there has been about 50 per cent improvement in the past two months. The eruption, therefore, will probably clear eventually.

Epithelioma in a Boy of Seventeen. Presented by DR. OSCAR L. LEVIN.

S. W., a boy aged 17, is presented from the Mount Sinai Hospital because of a lesion on the left ear of fifteen years' duration. When he was 2 years old, his mother noticed a small wart on his left ear following frostbite. The growth remained and slowly grew larger until it reached its present size. There have been no subjective symptoms except slight pain on trauma. Occasionally there has been slight bleeding. A year ago a physician treated it by electrolysis. The lesion was not affected favorably and has continued to grow slowly.

Examination shows a bean-sized oval ulcer on the lower part of the left ear. It is irregular and shows an uneven broken floor covered with crusts and grape seed-sized globular elevations. The border is elevated, pinkish and pearly, rolled out and hard.

Histologic examination showed papilloma. The pathologists suggested that another piece of the growth be removed for further study.

DISCUSSION

DR. OSCAR L. LEVIN: It is my opinion that ultimately the lesion will be found to be of a mixed type of epithelioma.

DR. LOUIS TULIPAN: I agree with the diagnosis.

DR. CHARLES WOLF: The matter of treatment here does not cause any great difficulty. The problem is to establish the diagnosis definitely. To go right ahead and cut off the lobe of the ear would be sufficient to eradicate the disease. It can be eradicated by electrodesiccation, or roentgen therapy can be used. The interesting feature is that the lesion is clinically epithelioma but the diagnosis has not been confirmed pathologically.

DR. ERICH URBACH, Vienna, Germany (by invitation): I should like to discuss treatment in this case. The diagnosis is clearly epithelioma, but in my opinion the treatment of cancer of the ear of this type is difficult. In the radiation therapy clinic my associates and I treated epithelioma of the ear in many cases without stopping the growth. We believe it is possible to treat the condition only surgically. No other measure is of value.

DR. GEORGE M. LEWIS: At first glance the lesion appears to be prickle cell epithelioma. However, the defect present around the central elevation may be due to repeated surgical interference. On palpation there is no infiltration, and since the histologic structure was that of papilloma, the diagnosis is still in doubt. It would seem to be wise to examine another biopsy specimen before doing anything radical.

NOTE.—Another specimen removed and examined subsequent to presentation was reported by the pathologists as not satisfactory. Therefore, the whole lesion will be removal surgically and studied histologically, and radiotherapy will be used subsequently.

Erythroplasia of Queyrat. Presented by DR. BOLESLAW LAPOWSKI and DR. ABRAHAM WALZER, Brooklyn.

M. S., a man aged 41, presented from the Samaritan Hospital, Brooklyn, has had an eruption on the penis for seven years. The patient has been presented on three previous occasions before this section, twice, on April 5 (ARCH. DERMAT. & SYPH. **26**:1124 [Dec.] 1932) and on Oct. 4, 1932 (ibid. **27**:688 [April] 1933), by Dr. M. B. Sulzberger, and the third time, on April 2, 1935 (*ibid.* **33**:160 [Jan.] 1936) by one of us (B. L.), the diagnosis at the first presentation being granuloma inguinale (?), and at the others, erythroplasia of Queyrat. The first and second presentations were made from another institution. The case was described by M. B. Sulzberger and D. L. Satenstein as one of erythroplasia of Queyrat (*ibid.* **28**:798 [Dec.] 1933).

At the present time the patient has a pea-sized patch on the right side of the glans. It is flat and level with the skin. The surface is granular and covered with a fine scale. The rest of the glans shows white areas (leukoderma like), the result of electrocoagulation. The inguinal glands are not enlarged.

Erythroplasia of Queyrat. Presented by DR. BOLESLAW LAPOWSKI and DR. ABRAHAM WALZER, Brooklyn.

M. S., a man aged 33, is presented from the Samaritan Hospital, Brooklyn, with a lesion on the glans penis of six years' duration. The patient was presented by Dr. Binford Throne before the New York Dermatological Society on Oct. 24, 1933 (ARCH. DERMAT. & SYPH. **29**:633 [April] 1934), with a tentative diagnosis of erythroplasia of Queyrat. This diagnosis was accepted. The lesions were twice electrocoagulated at another institution, but they recurred.

The patient first presented himself at the dispensary of the Samaritan Hospital in January 1935. On April 2, 1935, he was presented before this section with a diagnosis of erythroplasia of Queyrat (ARCH. DERMAT. & SYPH. **33**:160 [Jan.] 1936). His treatment up to the present time has consisted of application of simple pastes and lotions and the avoidance of irritation, the latter being accomplished by a mechanical device, the constant wearing of a light metal tube.

The lesions had almost disappeared for a time, but recurred. At present he shows two pea-sized lesions on the glans, the right somewhat larger than the left. They are red and somewhat elevated, with a finely granular surface partly covered with a thin scale. The rest of the glans shows white leukoderma-like patches, the result of electrocoagulation. The inguinal glands are not enlarged.

DISCUSSION ON CASES OF ERYTHROPLASIA OF QUEYRAT

DR. ABRAHAM WALZER, Brooklyn: These 2 cases are presented as instances of erythroplasia, showing the results of therapy, but the therapy has not been of the type suggested at the previous presentations, when both patients had active lesions. It was the consensus of the members that they both needed more roentgen therapy and electrocoagulation. That was in 1935. Since that time both men have had the simplest type of therapy, with mild pastes and lotions, and both have been using a contraption made of tin, a tube into which the penis is inserted, to keep it away from any external contact. The taller man's condition has practically cleared many times, but there has always been a recurrence when the tube was removed too soon. The other patient has also experienced considerable improvement. However, when the tube is removed for a while the condition has a tendency to recur in spots. They have had no roentgen therapy or electrocoagulation.

DR. FRED WISE: Confining my remarks entirely to therapy and basing them on 4 cases which I have observed, I should like to express the opinion that palliative treatment with boric acid ointment and similar mild remedies will never cure this disease after the diagnosis has been established microscopically. That is the consensus among the French observers, who have had many years' experience with the treatment of this disease against five years for American dermatologists. I

think roentgen and radium therapy are of little value and that in order to bring about permanent cure it is necessary to desiccate the lesions deeply. I believe that an eruption that looks like erythroplasia clinically but responds to application of boric acid ointment or similar palliative therapy is not erythroplasia.

DR. ANTHONY C. CIPOLLARO: I think if erythroplasia is treated sufficiently long by palliative measures, the patient will eventually return to have the inguinal and pelvic glands removed because of carcinomatous changes. Physicians who have observed cases of erythroplasia over a number of years have reported that carcinoma always follows this precancerosis if untreated.

DR. ABRAHAM WALZER, Brooklyn: It is Dr. Lapowski's opinion that in cases of erythroplasia cancer is produced either by the trauma of the therapy or by irritation from such trauma as rubbing of the clothes. He contends that if the lesion is kept away from irritation in any form, it will subside and no cancer will develop. It is true that in almost every case reported in the literature the condition eventually ended in cancer. Of course, the question can be raised whether the cancer was produced by the trauma of the treatment or by the dermatosis itself. According to the former concept, Dr. Lapowski has treated the condition without any irritation. Simple pastes and lotions have been used, but the most important part of the treatment has been the protection of the penis by the tube, which these men constantly carry with them. They are advised to avoid sexual intercourse. So far, I think, everybody will admit that the results have been satisfactory.

Mycosis Fungoides. Presented by DR. BOLESLAW LAPOWSKI and DR. ABRAHAM WALZER, Brooklyn.

S. Z., a man aged 65, is presented from the Samaritan Hospital, Brooklyn, because of an eruption on the trunk, extremities and face of seven and one-half years' duration. His past history is unimportant. The eruption began on the forearms with an itchy rash and spread rapidly. For six years he was treated at various local clinics, by autohemotherapy, intramuscular injection and roentgen therapy. He was first seen by us about six years ago, and at that time the lesions were already generalized over the entire body. They have, however, become more generalized and more aggravated since.

At this time the patient shows many different types of lesions: (1) many scattered tiny lichenoid papules, with scratched-off tops; (2) many erythematous patches composed of these papules; (3) erythematous, raised and infiltrated patches of various sizes and configurations, with different degrees of infiltration in the same patch, so that one part is more raised than the others. The border of some of the patches is raised and infiltrated, and the center is flat. Intermingled with these are definite raised infiltrated lesions varying in size from that of a pea to that of a dime or larger and often arranged in semiannular groupings. The face and ears show similar infiltrated lesions. Pruritus is marked, as evidenced by many scratch marks.

Physical examination showed no abnormalities. Examinations of the urine and the blood showed no abnormality, and serologic tests were negative.

The histologic picture was fairly typical of mycosis fungoides. There was marked acanthosis with some hyperkeratosis in the lower layers of the epidermis. The entire upper half of the cutis was the seat of a massive infiltration characterized by a great variety of cells. Most prominent among these were histiocytes, plasma cells and many large cells with deeply eosinophilic homogeneous plasma and large multinucleated vesicular nuclei. There were numerous large pale foam-like cells and occasional multinucleated large plasma cells. There was an increase in the connective tissue, as well as in the number of blood vessels.

Lupus Erythematosus Ulcerosus. Presented by DR. OSCAR L. LEVIN and DR. JESSE A. TOLMACH.

M. B., a youth aged 18, was admitted to the Beth Israel Hospital on Jan. 12, 1938, with ulcerated lesions on the forehead, the left side of the face and the hard

palate. The ulcerations had developed one day prior to his admission. At the time of his admission his temperature was 102 F., and he complained of headache, photophobia, nausea, chilliness and vomiting. The patient stated that he had been treated for lupus erythematosus since November 1931. He had received many intravenous injections of gold sodium thiosulfate at the Skin and Cancer Unit of the New York Post-Graduate Medical School and Hospital. The lesions were all healed in April 1933. He had a recurrence and was later treated at Bellevue Hospital dermatologic clinic. In January 1937 he returned to the Skin and Cancer Unit, where he was given subcutaneous injections of a vaccine containing hemolytic streptococci, hemolytic staphylococci and nonhemolytic streptococci. After the sixth of these injections, ulcers developed on the sites of the lesions on the left cheek. These healed.

At the time of his admission to Beth Israel Hospital there was an irregular half dollar–sized ulcerated lesion in the left malar region. In front of the left ear there were two small distinctly ulcerated patches. The right side of the forehead near the hair line showed an area typical of lupus erythematosus, and in this area, too, there was some ulceration. The skin over the nose and adjacent portion of the cheek was red, cyanotic, tense and glossy. The lower part of the left cheek was diffusely swollen and red. The nasal and the oral mucosa were congested, and on the hard palate there was superficial ulceration. The heart and lungs were normal except for a soft systolic blow at the apex of the heart. The temperature rose to 103.6 F. and returned to normal in four days. After the acute phase had passed, the patient was given potassium iodide by mouth and injections of a bismuth preparation. The ulcers healed quickly under this treatment and have left depressed scars.

Laboratory Data.—The Wassermann, the Kline and the Kahn test were negative. Except for a slight trace of albumin, the urine was normal. The blood count on admission showed 42,300 white blood cells, with 84 per cent polymorphonuclear leukocytes and 10 staff cells. In five days the white cell count had dropped to 11,000. The sedimentation rate and the chemical composition of the blood were normal. A culture of the scrapings of the cutaneous lesion showed no acid-fast bacilli. A roentgenogram of the chest showed no infiltration, no consolidation and no tuberculosis.

DISCUSSION

DR. DAVID BLOOM: I saw this patient a year ago, when he presented ulcerative lesions, besides a few typical lesions of lupus erythematosus on the face and on the mucous membranes of the mouth. Some of these lesions showed the peculiar whiteness of morphea, and this diagnosis was considered at one of the conferences at Bellevue Hospital. Lupus erythematosus may in some cases be destructive and disfiguring, and such is the case here.

Lichen Planus Atrophicus. Presented by DR. BOLESLAW LAPOWSKI and DR. ABRAHAM WALZER, Brooklyn.

M. L., a man aged 63, is presented from the Samaritan Hospital, Brooklyn, with lesions on both forearms of twelve years' duration. The past history showed nothing of importance. The primary lesions are flat shiny violaceous-red quadrangular papules arranged in linear and lacy network formation. Near the wrists the lesions are more elevated, more pronounced and more violaceous, but as they extend up toward the elbows they become flatter and more brownish, eventually becoming level with the skin. In general, the lesions which are regressing show faint wrinkling, which can readily be seen. Many of the papules, especially those on the backs of the hands and on the backs of the proximal phalanges, show prominent keratotic plugs which look like comedos. The palmar surfaces show a few scattered lesions of lichen planus. The penis, the mucous membranes of the mouth and the rest of the trunk show no lesions. Complete physical examination, blood counts, urinalysis and serologic tests showed no abnormality.

Histologic examination showed marked atrophy of the epidermis, with the absence of all rete pegs as well as papillae. There was patchy hypergranulosis. The basal zone showed marked dissociation, particularly in those zones where the granular layer had increased. In the subpapillary zone there was a banal type of infiltration, with a sharp horizontal lower limitation. There was marked fragmentation of the elastic tissue in the upper part of the cutis. This area was likewise the seat of moderate edema with some vascular dilatation. The deeper corium and the layers of the adnexa were normal. The diagnosis was lichen planus atrophicus.

DISCUSSION

DR. PAUL GROSS: May I suggest in this case the diagnosis of melanodermatitis toxica on the basis of the clinical picture and particularly on account of the histologic changes of lichen planus? The man is a tailor and machine operator and therefore exposed to machine oil.

DR. ABRAHAM WALZER, Brooklyn: This man does not use oils or greases in his work. He is a tailor and sews all day. He has had this condition for twelve years. The lesions are limited to the forearms. There are no lesions on the penis and none in the mouth. Clinically the lesions are typical of lichen planus atrophicus. The only unusual thing about them is the unusual distribution. Histologic examination of the section showed typical lichen planus atrophicus.

DR. SAMUEL FELDMAN: The picture is typical of this condition. There are lesions of lichen planus, pigmentation, which is almost everlasting in some cases, and keratotic lesions on the backs of the hands, especially the phalanges. The picture is typical of the acuminate type of lichen planus. The acuminate lesions represent lichen planus around the hair follicles. If a condition of this type were found on the head too, some would call the picture folliculitis decalvans and lichen spinulosus (Little's disease), but in reality it is a type of atrophic lichen planus.

DR. HERMAN GOODMAN: I have a different conception because of this man's job. He works in shirt sleeves and close to a light to get the illumination against the needle. There are no lesions beyond the bared part of the arms. The dye of the cloth he handles, plus the light, causes the condition he presents. The sites where the cloth is in contact with his arms explain the uneven distribution. The lesions are on both hands, more on one forearm than the other and on the side of one forearm and the front of the other.

Multiple Benign Cystic Epithelioma; Lichen Sclerosus et Atrophicus.
Presented by DR. BOLESLAW LAPOWSKI and DR. ABRAHAM WALZER, Brooklyn.

A. A., a woman aged 53, is presented from the Samaritan Hospital, Brooklyn, because of lesions on the face of many years' duration and lesions on the upper part of the abdomen and under the breasts of one and one-half years' duration. The patient has never been seriously ill, except when she had an operation for goiter five years ago.

The lesions on the lower lids are symmetrically situated and consist of a group of white elevated flat lesions, sharply outlined and varying in size from that of a pinpoint to that of a pinhead or a little larger. They are embedded in the skin but project to a variable degree above the surface. They are not inflammatory. These are benign cystic epitheliomas. The atrophic lichenoid lesions are limited to the anterior upper part of the abdomen and the under surfaces of the breasts. The primary lesion is a white, often polygonal, flat papule on the level of the skin or slightly elevated, surrounded by a faint erythematous zone and in some instances showing a slight depressed center. The lesions combine in groups or in irregularly shaped patches of various sizes, in which the individual lesion can still be discerned. The patches are elevated and surrounded by a faint erythematous halo. The surface of many of these patches, especially those under the breasts, is rough, hard and somewhat wrinkled and shows horny plugs protruding from many of the individual lesions. In some places where the keratotic plugs have

been expelled minute follicular openings can be seen. When the patient was first observed, there were a few tiny red points or papules, which were considered primary, but their change to white papules could not be seen. The rest of the body and the mucous membranes show no lesions.

The histologic examination showed marked atrophy of the epidermis, which was almost a straight line, and hyperkeratosis which dipped into the follicles. There was no increase in the granular layer. The striking features of the section were large subepidermal bullae filled with pink-staining homogeneous material in which were scattered a few blood cells. The roof of these blebs was formed on the basal layer of the epidermis, the lower margin of the blebs being poorly limited by the collagen bundles. There was moderate focal cellular infiltration only in the upper part of the cutis; this was chiefly perivascular. The rest of the cutis was the seat of marked hypertrophy of the connective tissue, with no cellular infiltration. The adnexa were normal. A study of the smallest lesions showed the same tendency to the formation of bullae between the epidermis and the corium as was noted in the larger hypertrophic verrucoid plaques.

Naevus Flammeus Appearing at the Age of Eighteen. Presented by DR. HENRY D. NILES.

L. D., a man aged 20, states that two years ago lesions developed on the chin and right cheek. The family history was irrelevant, except that one uncle from the ages of 5 to 15 years had similar spots under his eyes. These have completely disappeared. The patient had no lesions until two years ago, when red patches gradually appeared on the chin, lower lip and right cheek. These have since spread. The lesions give no sensation and have not been treated. They did not follow frostbite or exposure to cold. The patient has a habit of resting his hand on his chin and right cheek. The lesions become more marked in cold weather, and in extreme cold all of the face becomes dusky red. A recent physical examination showed no abnormality except hypertension (the systolic blood pressure being from 140 to 160). The patient has frequent colds but no sinal infection. He never has nosebleed and does not bleed profusely after being cut. The patches become irritated after shaving and when he is fatigued.

Examination shows a quarter-sized irregularly round patch of erythema and dilated blood vessels on the lower outer part of the right cheek. An ill defined smaller similar area involves most of the chin and lower lip. The color of all of the patches fades on pressure. The patches are of normal temperature. The mucous membrane of the lower lip and cheeks is not involved.

Lichen Planus with Involvement of the Mucous Membranes of the Mouth and Larynx. Presented by DR. FRANK VERO.

E. L., a woman aged 55, is presented from the New York Polyclinic Medical School and Hospital, with lesions involving the legs, sacral region, wrist, mouth and larynx of seventeen years' duration. About seventeen years ago the patient had a generalized eruption, which she attributes to poisoning from fish. This eruption cleared in four months, except in the locations just mentioned, where it has persisted ever since with varying intensity. During the last four or five years, hoarseness developed; this has become progressively worse in the past three months. The patient underwent an operation on the gallbladder five years ago. At present she is under treatment for a cardiac condition.

On the anterior aspect of the lower part of the legs are numerous small solitary reddish violaceous flat-topped papules and a few confluent plaques. Around the ankles are a large number of closely grouped annular lesions with clearing centers. Below the left knee and in the sacral region similar annular lesions are present, and there is marked pigmentation on the sites of former lesions. On the right buccal mucosa is a diffuse irregularly outlined whitish-grayish and slightly pigmented smooth and soft patch. Laryngologic examination by Dr. Joseph

Kempfner showed an unusual picture. Both the vocal cords, the false cords and the interarytenoid spaces showed reddish-bluish gray thickening of the mucous membrane, the surface of which was nodular, with distinct white striae, in irregular distribution mainly on the vocal cords. The changes resembled those seen on the mucous membranes of the mouth. The pathologist stated that histologic examination of a biopsy specimen from the larynx showed fibroid structure.

Erythrasma. Presented by DR. LOUIS CHARGIN.

J. P., a man aged 74, was previously presented before this section in April 1938 (ARCH. DERMAT. & SYPH. **38**:819 [Nov.] 1938). Since this presentation further laboratory studies have been done. Cultures have shown no organism. Examination of tissue under the Wood filter showed nothing relevant. Microscopic examination of a slide stained with methylene blue showed Microsporon minutissimum.

Lichen Planus. Presented by DR. NATHAN SOBEL.

Lupus Vulgaris. Presented by DR. E. WILLIAM ABRAMOWITZ.

Roentgen Dermatitis with Possible Involvement of Underlying Breast. Presented by DR. HERMAN GOODMAN.

Morphea. Presented by DR. JESSE A. TOLMACH and DR. JOEL SCHWEIG (by invitation).

Morphea. Presented by DR. ANDREW HARP MONTGOMERY.

Book Reviews

La syphilis du système nerveux: Pathologie générale, thérapeutique et prophylaxie. By A. Sézary. Paper. Price, 48 francs. Pp. 283, with 28 illustrations. Paris: Masson & Cie, 1938.

A distinguished syphilographer, a teacher and a dermatologist as well as a neurologist, the author has an experience of thirty years in research in and in treatment of syphilis.

Remarkable for the scope of knowledge revealed and its keen analysis and coherence, this monograph represents a school of thought in neurosyphilis which, it is predicted, will constantly add new converts.

The work is divided into five parts, dealing with (1) the cerebrospinal fluid and syphilitic meningitis, (2) the etiology of syphilis of the nervous system, (3) its pathogenesis, (4) its treatment and (5) its prophylaxis.

Three things are attempted:

1. Sézary maintains and defends a pathogenic doctrine, supported clinically and histologically and by biologic reactions and therapeutic results, which considers the site of infection in the nerve tissue and the reactions of the host, and not especial characteristics of the pathogenic microbe, as responsible for the elements which accord to syphilis of the nervous system its originality.

2. He reports the results of his therapeutic researches. A method of treating dementia paralytica is recommended, and its results are compared with those reported and observed for malaria therapy by others.

3. He insists on methods of prophylaxis based on the general pathology of syphilis and shows how syphilitic persons can be insured against the neural complications with which they are menaced.

Directory of Dermatologic Societies *

INTERNATIONAL

Tenth International Congress of Dermatology and Syphilology

Oliver S. Ormsby, President, 25 E. Washington St., Chicago.
Paul A. O'Leary, Secretary-General, 102–2d Ave., S. W., Rochester, Minn.
Place: New York. Time: Summer 1940.

Pan American Medical Association, Section of Dermatology and Syphilology

Elmore B. Tauber, President, 19 W. 7th St., Cincinnati.
Austin W. Cheever, Secretary, 49 Bay State Rd., Boston.

FOREIGN

British Association of Dermatology and Syphilology (Canadian Branch)

Harold Orr, President, 10189–101st St., Edmonton.
Don Mitchell, Secretary-Treasurer, 1414 Drummond St., Montreal.

Royal Society of Medicine, Section of Dermatology

H. W. Barber, President, 7 Devonshire Pl., London, W. 1, England.
Louis Forman, Secretary, 7 Devonshire Pl., London, W. 1, England.

NATIONAL

American Medical Association, Scientific Assembly, Section on Dermatology and Syphilology

J. Bedford Shelmire, Chairman, 1719 Pacific Ave., Dallas, Texas.
C. F. Lehmann, Secretary, 705 E. Houston St., San Antonio, Texas.
Place: St. Louis. Time: May 15-19, 1939.

American Academy of Dermatology and Syphilology

Paul A. O'Leary, President, Mayo Clinic, Rochester, Minn.
Earl D. Osborne, Secretary, 471 Delaware Ave., Buffalo, N. Y.
Place: Philadelphia.

American Board of Dermatology and Syphilology

Howard Fox, President, 140 E. 54th St., New York.
C. Guy Lane, Secretary-Treasurer, 416 Marlborough St., Boston.

American Dermatological Association

Francis E. Senear, President, 55 E. Washington St., Chicago.
Fred D. Weidman, Secretary, University of Pennsylvania, Philadelphia.
Place: Seigniory Club, Montebello, Ontario, Canada. Time: May 1939.

Society for Investigative Dermatology

Joseph V. Klauder, President, 1934 Spruce St., Philadelphia.
S. W. Becker, Secretary, University of Chicago, Department of Medicine, Chicago.

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* Secretaries of dermatologic societies are requested to furnish the information necessary for the editor to make this list complete and to keep it up to date.

SECTIONAL

Central States Dermatological Association

George H. Belote, President, University Hospital, Ann Arbor, Mich.
Thomas H. Miller, Secretary-Treasurer, 1305 David Whitney Bldg., Detroit.
Place: Pittsburgh. Time: March 25, 1939.

Mississippi Valley Dermatological Society

Hamilton Montgomery, President, Mayo Clinic, Rochester, Minn.
Herbert Rattner, Secretary-Treasurer, 25 E. Washington St., Chicago.
Place: Chicago.

New England Dermatological Society

Fred S. Burns, President, 83 Marlborough St., Boston.
B. Appel, Secretary, 483 Beacon St., Boston.

Northern New Jersey Dermatological Society

Francis McCauley, President, 31 Lincoln Pk., Newark.
Henri Abel, Secretary, 339 Union Ave., Elizabeth.
Place: Academy of Medicine of Northern New Jersey, Newark. Time: Third Tuesday of March, April, October and December.

Southeastern Dermatological Association

J. L. Kirby-Smith, Chairman, 204 Laura St., Jacksonville, Fla.
Joseph A. Elliott, Secretary, Professional Bldg., Charlotte, N. C.

Southern Medical Association, Section on Dermatology and Syphilology

M. Toulmin Gaines, Chairman, 404 Merchants National Bank Bldg., Mobile, Ala.
Clinton W. Lane, Secretary, 508 N. Grand Ave., St. Louis.

STATE

California Medical Association, Scientific Assembly, Dermatology and Syphilology Section

Norman N. Epstein, Chairman, 450 Sutter St., San Francisco.
Arne E. Ingels, Secretary, 490 Post St., San Francisco.

Connecticut State Medical Society, Section on Dermatology

James D. Gold, Chairman, 839 Myrtle Ave., Bridgeport.
Albert Levenson, Secretary, 881 Lafayette St., Bridgeport.

Florida Society of Dermatology and Syphilology

Elmo D. French, Chairman, Huntington Bldg., Miami.
Lauren M. Sompayrac, Secretary, 459 St. James Bldg., Jacksonville.

Louisiana Dermatological Society

M. T. Van Studdiford, President, 912 Pere Marquette Bldg., New Orleans.
R. A. Oriol, Secretary-Treasurer, 921 Canal St., New Orleans.

Massachusetts Medical Society, Section on Dermatology and Syphilology

E. Lawrence Oliver, President, 20 Fairfield St., Boston.
J. G. Downing, Secretary, 520 Commonwealth Ave., Boston.

Medical Society of the State of New York, Section on Dermatology and Syphilology

Mark Heiman, Chairman, 600 Medical Arts Bldg., Syracuse.
Timothy J. Riordan, Secretary, 136 E. 64th St., New York.

MEDICAL SOCIETY OF THE STATE OF PENNSYLVANIA
SECTION ON DERMATOLOGY

William D. Whitehead, Chairman, Medical Arts Bldg., Scranton.
V. C. Garner, Secretary, Germantown Professional Bldg., Philadelphia.

MICHIGAN STATE MEDICAL SOCIETY, SECTION ON DERMATOLOGY AND SYPHILOLOGY

Ruth Herrick, Chairman, 26 Sheldon Ave., S. E., Grand Rapids.
Eugene A. Hand, Secretary, 801 Second National Bank Bldg., Saginaw.

MINNESOTA DERMATOLOGICAL SOCIETY

E. M. Rusten, President, 78 S. 9th St., Minneapolis.
F. W. Lynch, Secretary-Treasurer, Lowry Medical Arts Bldg., St. Paul.
Time: First Friday in October, December, February and April.

OKLAHOMA STATE DERMATOLOGICAL SOCIETY

Onis George Hazel, President, Osler Bldg., Oklahoma City.
Everett S. Lain, Secretary, Medical Arts Bldg., Oklahoma City.

TEXAS DERMATOLOGICAL SOCIETY

Everett R. Seale, President, 1215 Walker Ave., Houston.
Duncan O. Poth, Secretary, 414 Navarro St., San Antonio.

LOCAL

BALTIMORE-WASHINGTON DERMATOLOGICAL SOCIETY

Francis A. Ellis, President, 104 W. Madison St., Baltimore.
I. Louis Sandler, Secretary, 1835 I St., N. W., Washington, D. C.
Place: Alternate cities. Time: Third Thursday of each month.

BRONX DERMATOLOGICAL SOCIETY

Samuel M. Peck, President, 125 E. 72d St., New York.
Henry Silver, Secretary, 290 West End Ave., New York.

BROOKLYN DERMATOLOGICAL SOCIETY

M. J. Cantor, President, 907 St. Marks Ave., Brooklyn.
S. H. Silvers, Secretary, 920 Bushwick Ave., Brooklyn.
Time: Third Monday of each month except June, July, August and September.

BUFFALO-ROCHESTER DERMATOLOGICAL SOCIETY

Richard L. Saunders, President, 333 Linwood Ave., Buffalo.
James W. Jordon, Secretary, 471 Delaware Ave., Buffalo.

CENTRAL NEW YORK DERMATOLOGICAL SOCIETY

Rudolph Ruedemann Jr., President, 256 State St., Albany.
Harry D. Parkhurst, Secretary-Treasurer, 264 Genesee St., Utica.

CHICAGO DERMATOLOGICAL SOCIETY

Hamilton Montgomery, President, Mayo Clinic, Rochester, Minn.
Herbert Rattner, Secretary, 25 E. Washington St., Chicago.

CINCINNATI DERMATOLOGICAL SOCIETY

Adolph B. Loveman, President, 332 W. Broadway, Louisville, Ky.
Daniel J. Kindel, Secretary-Treasurer, Union Central Bldg., Cincinnati.
Place: Cincinnati. Time: First Wednesday of each month, except June, July, August and September.

Cleveland Dermatological Society

John Gammel, President, 1020 Huron Rd., Cleveland.
Charles G. La Rocco, Secretary, 2060 E. 9th St., Cleveland.

Detroit Dermatological Society

G. Warren Hyde, President, 2501 W. Grand Blvd., Detroit.
Thomas H. Miller, Secretary-Treasurer, 1305 David Whitney Bldg., Detroit.
Place: Detroit. Time: May 1939.

Los Angeles Dermatological Society

Thomas W. Nisbet, President, 65 N. Madison Ave., Pasadena, Calif.
C. R. Caskey, Secretary, 1930 Wilshire Blvd., Los Angeles.
Time: Second Tuesday of each month, October to May, inclusive.

Manhattan Dermatologic Society

Max Scheer, Chairman, 509 Madison Ave., New York.
Anthony C. Cipollaro, Secretary, 40 E. 61st St., New York.

Montreal Dermatological Society

L. P. Ereaux, President, 1390 Sherbrooke St., W., Montreal, Canada.
Paul Poirier, Secretary, 456 Sherbrooke St., E., Montreal, Canada.

New York Academy of Medicine, Section of Dermatology and Syphilis

Eugene F. Traub, Chairman, 140 E. 54th St., New York.
Louis Tulipan, Secretary, 224 E. 17th St., New York.

New York Dermatological Society

J. Frank Fraser, President, 100 W. 59th St., New York.
Frank C. Combes, Secretary, 80 W. 40th St., New York.

Omaha Dermatological Society

Donald J. Wilson, President, 1113 Medical Arts Bldg., Omaha.
Leonard J. Owen, Secretary-Treasurer, 954 Stuart Bldg., Lincoln, Neb.

Philadelphia Dermatological Society

Thomas Butterworth, Chairman, 411 Walnut St., Reading, Pa.
Herman Beerman, Secretary, 255 S. 17th St., Philadelphia.
Time: Third Friday of each month from September to May, inclusive.

Pittsburgh Dermatological Society

John C. Kerr, President, 62–14th St., Wheeling, W. Va.
Marvin B. Goldstein, Secretary, Stambaugh Bldg., Youngstown, Ohio.
Time: Third Thursday of every month except July and August.

St. Louis Dermatological Society

Martin F. Engman Jr., President, 3720 Washington Blvd., St. Louis.
Roy L. Kile, Secretary-Treasurer, 3720 Washington Blvd., St. Louis.
Place: Barnard Free Skin and Cancer Hospital. Time: 2 p. m., second Wednesday of each month.

San Francisco Dermatological Society

Norman Epstein, President, 450 Sutter St., San Francisco.
H. V. Allington, Secretary, 3115 Webster St., Oakland, Calif.